

MONITORING THE MIGRATIONS OF WILD SNAKE RIVER SPRING/SUMMER CHINOOK SALMON SMOLTS, 1995

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EXECUTIVE SUMMARY

We PIT tagged wild spring/summer chinook salmon parr in the Snake River Basin in 1994 and subsequently monitored these fish during their smolt migration through Lower Granite, Little Goose, Lower Monumental, McNary, John Day, and Bonneville Dams during spring, summer, and fall 1995. This report details our findings, which are summarized below.

- 1) We PIT tagged and released 18,459 wild chinook salmon parr in 17 streams in Idaho in July and August 1994.
- 2) The average overall observed mortality from collection, tagging, and 24-hour holding was 1.5%. No PIT tags were lost during the 24-hour holding period to assess delayed mortality from collection, handling, and tagging.
- 3) In 1995, the overall adjusted percentage of PIT-tagged fish released and subsequently detected at the six dams averaged 11.8% (range 6.3 to 28.9%, depending on stream of origin).
- 4) Fish that were larger at release were detected at a significantly higher rate the following spring and summer than their smaller cohorts ($P < 0.0001$).
- 5) Wild fish migrating in April and May were significantly larger at release than fish migrating after May ($P < 0.0001$).
- 6) At McNary Dam in 1995, the 62 wild chinook salmon smolts that were weighed and measured grew an average of 42.2 mm in length and gained an average of 10.0 g in weight over an average of 284.1 days.
- 7) In 1995, migration timing of wild spring/summer chinook salmon smolts at Lower Granite Dam was unique compared to previous years, with peak passage on 9 May. However, as observed in previous years, peak detections of fish from individual streams in 1995

occurred over an extended period. During the 6 years before 1995, passage timing of wild fish at this dam was highly variable and generally independent of river flows before mid-May. In contrast, during this period, peak passage of wild fish after about mid-May tended to coincide well with periods of peak river flow. In 1995, sustained high flows from mid-May to early June moved wild fish through the dam at a more uniform rate than in previous years, and over 90% had passed when peak flows occurred at the dam on 6 June.

- 8) Before 1995, we observed a 2-week shift in timing of wild fish at Lower Granite Dam between relatively warm and relatively cold years. In the colder-than-normal years of 1989, 1991, and 1993, 50% of all wild fish passed the dam by mid-May, while 90% passed by mid-June (except 1993 when high flows moved 90% through the dam by the end of May). In the warmer-than-normal years of 1990, 1992, and 1994, 50% of all wild fish passed this dam from 29 April to 4 May, and 90% passed by the end of May. In 1995, we experienced near-normal weather conditions in late winter and early spring and observed intermediate passage timing at the dam (compared to previous years) with 50 and 90% passage on 9 May and 5 June, respectively.
- 9) Diel timing patterns of wild chinook salmon smolts exiting from the fish and debris separators varied among the dams. At Lower Granite and Lower Monumental Dams, more wild fish exited the separators during nighttime hours (1800-0600 h) than exited during the day (0600-1800 h), but the difference was significant only at Lower Granite Dam. At both Little Goose and McNary Dams, more wild fish exited the separators during daytime hours than exited at night, but the difference was significant only at Little Goose Dam.

INTRODUCTION

Project Goals

The goals of this study are to 1) characterize the migration timing of different wild stocks of Snake River spring/summer chinook salmon smolts at dams on the Snake and Columbia Rivers, 2) determine if consistent patterns are apparent, and 3) determine what environmental factors influence migration timing.

Background

The National Marine Fisheries Service (NMFS) began a cooperative study with the U.S. Army Corps of Engineers (COE) in 1988 to mark wild Snake River spring and summer chinook salmon parr with Passive Integrated Transponder (PIT) tags for transportation research. This project continued through mid-1991, with migrating smolts monitored as they passed Lower Granite, Little Goose, and McNary Dams during spring and summer 1989-1991 (Matthews et al. 1990, 1992; Achord et al. 1992). Information from this study demonstrated that the timing of various wild stocks through Lower Granite Dam differed among streams of origin and also differed from patterns for hatchery-reared fish. Generally, the migrations of wild spring chinook salmon were later and more protracted than those of their hatchery-reared counterparts, and they also exhibited variable timing patterns over the 3 years. Conversely, the migrations of wild summer chinook salmon were earlier and more protracted than those of their hatchery counterparts.

The present study began with the 1992 migration of wild chinook salmon smolts (Achord et al. 1994). Warmer-than-normal weather and higher-than-normal water temperatures in late winter and spring appeared to elicit an early migration timing for all wild smolts in 1992. The migration timing of wild spring chinook salmon smolts in 1992 was earlier than for the previous 3 years. Also, most wild summer chinook salmon smolts migrated earlier than wild spring chinook salmon smolts. However, as was observed during previous years, all wild stocks exhibited protracted and variable migration timing at Lower Granite Dam.

In 1993, cooler-than-normal weather and low water temperatures from late winter to early summer appeared to elicit a late migration timing; however, high flows during the third week of May moved a large portion of wild spring/summer chinook salmon through the dams (Achord et al. 1995a). As observed in previous years, wild stocks also exhibited variable migration timing at Lower Granite Dam; however, the middle 80% passage time of wild fish at the dam was more compressed in 1993 than in earlier years.

In 1994, migration timing of wild spring/summer chinook salmon smolts at Lower Granite Dam was similar to timing in 1990 and 1992, with peak passage in all 3 years in April; however, peak detections of fish from individual streams in 1994 occurred from late April to late May. As observed for 1990 and 1992, 1994 was also warmer than normal during late winter and spring.

Prior to 1992, decisions on dam operations and use of stored water relied on recoveries of branded hatchery fish, index counts at traps and dams, and flow patterns at the dams. In 1992, a more complete approach integrated PIT-tag detections of several wild spring and summer chinook salmon stocks at Lower Granite Dam. We initiated a database on wild fish,

which addresses several goals of the Columbia River Basin Fish and Wildlife Program of the Pacific Northwest Electric Power Planning Council and Conservation Act (1980). Section 304(d) of the program states: “The monitoring program will provide information on the migrational characteristics of the various stocks of salmon and steelhead within the Columbia Basin.” Further, Section 201(b) urges conservation of genetic diversity. This will only be possible if wild stocks are preserved. The advent of PIT-tag technology has provided the opportunity to precisely track the smolt migrations of many stocks as they pass through the hydroelectric complexes on their way to the ocean.

This report provides information on PIT tagging of wild chinook salmon parr in 1994, and the subsequent monitoring of these fish. Fish were monitored as they migrated through some juvenile migrant traps in 1994 and 1995 as well as Lower Granite, Little Goose, Lower Monumental, McNary, John Day, and Bonneville Dams during 1995.

FISH COLLECTION AND TAGGING

In 1992, Oregon Department of Fish and Wildlife (ODFW) began PIT tagging wild chinook salmon parr in the Grande Ronde and Imnaha River drainages in northeast Oregon. All tagging, detection, and timing information for fish from these streams in 1994-1995 will be reported by ODFW. However, with ODFW's concurrence, NMFS will continue to report the timing at Lower Granite Dam of fish from those streams in Oregon where we PIT tagged wild chinook salmon from 1988 to 1991.

We collected and PIT tagged wild chinook salmon parr from various reaches of each targeted stream during July, and August 1994 (Fig. 1). Our primary objective was to collect

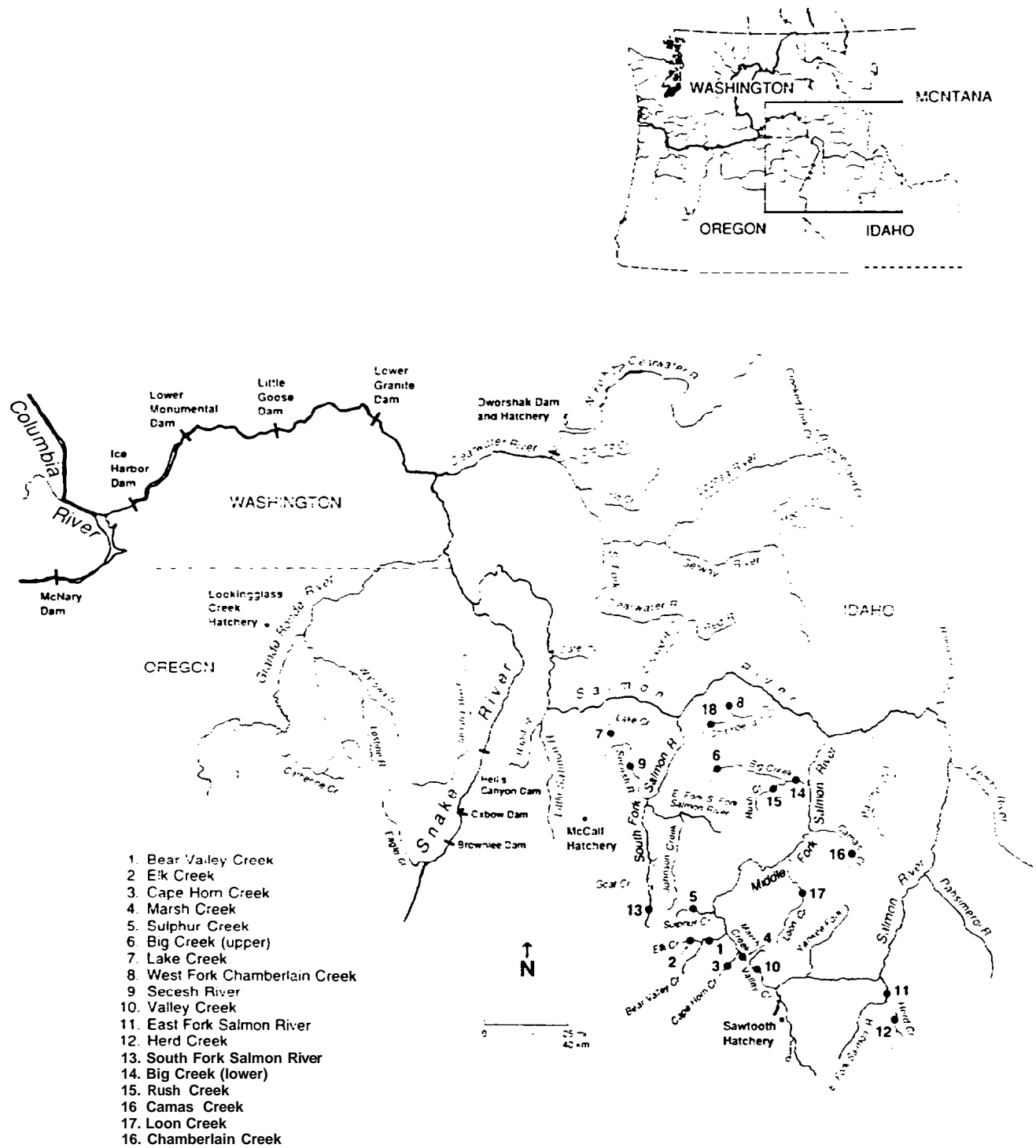


Figure i. Study area where wild spring/summer chinook salmon parr were PIT tagged during summer 1994

parr in these streams quickly and with minimal impact to the fish. Areas of high parr concentrations were located by snorkeling in advance of collection. Thus, we concentrated our collection and marking efforts in areas within each stream where parr abundance was highest.

Collection and PIT-tagging procedures described by Matthews et al. (1990) and Achord et al. (1994, 1995a, 1995b) were used for our field work in 1994.

From 27 July to 24 August 1994, we collected 24,874 wild chinook salmon parr in Idaho over a distance of about 50 stream kilometers (Table 1 and Appendix Table 1). Of these, 18,459 fish were PIT tagged and released back into the streams. Numbers tagged and released per stream ranged from 15 in Rush Creek to 1,575 in Marsh Creek. Fork lengths of tagged and released wild fish ranged from 45 to 118 mm (mean 65 mm). Weights ranged from 1.2 to 12.0 g (mean 3.6 g).

Table 2 provides a summary of species other than chinook salmon observed during electrofishing or seining operations. The most abundant of these was sculpin. We caution that the numbers of fish in Table 2 do not represent abundance of all other fish in the areas of collection.

Mortality associated with collection and tagging procedures was low, and 24-hour tag loss was zero (Table 3 and Appendix Table 2). Average collection mortality was 1.3% (all collection mortality occurred during electrofishing), average tagging mortality was 0.1 %, and average 24-hour delayed mortality was 0.5%. The average overall observed mortality was 1.5%.

Table 1. Summary of wild chinook salmon parr collected, PIT tagged and released; average fork lengths and weights; and approximate distances covered in streams of Idaho during July and August 1994.

Tagging location	Number collected	Number tagged and released	Average length of tagged fish (mm)	Average weight of tagged fish (g)	Kilometers covered in streams
Brar Valley Creek	1,558	1,455	63	3.5	5
Elk Creek	1,542	1,512	67	4.1	4
Sulphur Creek	769	728	62	3.0	2
Marsh Creek	1,680	1,575	69	4.0	3
Cape horn Creek	3,833	1,443	62	2.6	1
Valley Creek	1,944	1,552	64	3.7	2
Camas Creek	1,986	1,528	61	3.2	3
Loon Creek	1,023	964	65	3.5	2
Herd Creek	568	531	74	3.9	2
E. Fork Salmon River	1,070	986	74	5.4	3
Big Creek (upper)	862	757	62	3.4	3
S. Fork Salmon River	4,017	1,569	59	2.6	5
Big Creek (lower)	757	727	75	5.3	4
Rush Creek	15	15	75	—	2
W. Fork Chamberlain Creek	928	917	66	3.3	2
Chamberlain Creek	266	241	65	—	2
Secesh River	1,593	1,551	63	3.2	3
Lake Creek	463	405	63	—	2
Totals or averages	24,874	18,459	65	3.6	50

Table 2. Summay of species other than chinook salmon observed during collection operations in various Idaho streams. July and August 1994.

Stream	Steelhead	Brook trout	Whitefish	Curthraat trout	Bull trout	Sculpin	Dace	Sucker
Bear Valley Creek	316	528	205	0	0	455	107	0
Elk Creek	161	430	55	0	0	209	2	0
Sulphur Creek	367	0	151	1	0	1,782	7	0
Marsh Creek	202	174	253	0	0	156	2	0
Cape Horn Creek	2	96	3	0	0	154	7	0
Valley Creek	17	229	67	0	0	338	S-I	0
Camas Creek	1,076	1	1	0	0	0	0	0
Loon Creek	797	1	1		8	1,151	0	0
herd Creek	388	0	12	0	7	202	0	0
E. Fork Salmon River	1,186	1		0	0	1,187	0	0
Big Creel, (upper)	233	151	1	0	4	1,862	0	0
S. Fork Salmon River	388	21	282	3	0	369	3	0
Big Creek lower)	994		0	3	0	2,248	2,425	0
Rush Creek		-----		--	-----	-----	--
W. Fork Chamberlain Creek	362	0	52	0	I-I	95	0	0
Chamberlain Creek	219	0	50	0	0	350	0	0
Secesh riv er	312	35	4	0	0	386	169	0
Lake Creek	1-1'	78	22	0	6	410	9	0
Totals	7,162	1,747	1,162	2	34	11,354	2,810	0

¹ Big Creek (lower) numbers of fish includes numbers collected in Rush Creek.

Table 3. Mortality and tag loss for wild chinook salmon parr collected and PIT tagged in Idaho. July and August 1994.

Tagging location	Mortality %			Overall	24-hour tag loss (%)
	Collection	Tagging	24-hour		
Bear Valley Creek	1.7	0.2	0.4	2.0	0.0
Elk Creek	1.7	0.1	0.0	1.8	0.0
Sulphur Creek	0.4	0.0	0.0	0.4	0.0
Marsh Creek	0.2	0.9	0.0	1.1	0.0
Cape Horn Creek	0.1	0.0	0.6	0.2	0.0
Valley Creek	0.3	0.9	9.9	0.3	0.0
Camas Creek	27	0.0	0.7	3.0	0.0
Loon Creek	2.1	0.0	---	2.1	---
Herd Creek	4.8	0.9	---	4.8	---
E. Fork Salmon River	7.1	0.0	---	7.4	---
Big Creek (upper)	1.1	0.0	---	1.4	---
S. Fork Salmon River	0.6	0.1	0.8	0.7	0.0
Big Creek (lower)	3.8	0.0	---	3.8	---
Rush Creek	0.0	0.0	---	0.0	---
W. Fork Chamberlain Creek	0.0	0.0	---	0.0	---
Chamberlain Creek	0.4	0.0	---	0.4	---
Secesh River	0.6	0.0	---	0.6	---
Lake Creek	0.2	0.2	---	0.4	---
Averages	1.3	0.1	0.5	1.5	0.0

DETECTIONS AT TRAPS

During fall 1994, juvenile migrant fish traps were operated on Marsh Creek and the South Fork of the Salmon River. During spring 1995, juvenile migrant fish traps were operated on the lower Salmon River near Whitebird, Idaho, and the Snake River at Lewiston, Idaho. All traps were operated by the Idaho Department of Fish and Game.

A total of 158 previously PIT-tagged wild spring/summer chinook salmon from Idaho were detected at the 4 juvenile migrant fish traps combined in fall 1993 and spring 1995. A total of 122, 12, 15, and 9 were detected at the Marsh Creek trap, the Salmon River trap, the South Fork Salmon River trap, and the Snake River trap, respectively. At the migrant trap on Marsh Creek, 56 of the 122 fish detected were weighed and measured. They had grown an average of 7.7 mm in length (range 0-23 mm) and gained an average of 1.3 g in weight, with an average of 51.2 days between measurements. The overall average length of released fish from Marsh Creek in summer (69 mm), was the same as the overall average length at release for fish detected at the Marsh Creek trap in the fall. Of the 15 fish detected at the South Fork of the Salmon River trap, 3 were measured and had grown an average of 7.0 mm (range 1-13 mm) over an average of 55.6 days between measurements. So measurements were recorded on the remaining 21 PIT-tagged fish detected at the 2 downstream juvenile migrant fish traps on the Salmon and Snake Rivers in spring 1995.

DETECTIONS AT DAMS

During spring, summer, and fall 1995, surviving chinook salmon PIT tagged for this study migrated volitionally downstream through the hydroelectric complex on the Snake and

Columbia Rivers. Of the eight dams the smolts passed, four were equipped with complete smolt collection and PIT-tag monitoring systems: Lower Granite, Little Goose, and Lower Monumental Dams on the Snake River, and McNary Dam on the Columbia River (Fig. I). Two additional dams below McNary Dam, John Day and Bonneville Dams, were equipped with PIT-tag detection gear within their sub-sampling systems.

At the four smolt collection dams, all smolts guided away from the turbine intakes and into the juvenile bypass systems were electronically interrogated for PIT tags as they passed through the distribution flumes downstream from the outlet orifices of the fish and debris separators. The PIT-tag monitor systems were the same as those described by Prentice et al. (1990). Dates and times to the nearest second were recorded on a computer as PIT-tagged fish passed through the numbered detector coils in the fish distribution flumes. All detection data were transferred once each day to the mainframe computer operated by the Pacific States Marine Fisheries Commission in Portland, Oregon.

Since the PIT-tag detection/diversion systems (Matthews et al. 1990, 1992; Achord et al. 1992) were operational at Lower Granite, Little Goose, Lower Monumental, and McNary Dams throughout the migration season, most PIT-tagged fish were diverted back to the river below these dams. Therefore, to accurately portray timing at the dams for the various wild stocks of fish, we used first-time detections at each dam and adjusted these detections daily for spill. The equation used to adjust the daily detections for individual streams and

combined populations at each dam was

$$\frac{\text{number detected}}{\text{average daily powerhouse flow}} = \frac{X}{\text{average daily flow spilled}}$$

with X rounded to the nearest whole number and added to the number detected to produce an adjusted number of PIT-tagged fish passing each dam daily for individual or combined populations!.

From 10 April to 22 September 1995, an adjusted total of 2,173 fish PIT tagged in Idaho were detected (first-time) at the 6 dams (Table 4 and Appendix Tables 4.A-2 1 B). Based upon the number of parr PIT tagged and released in 199-1 (18,459), the overall average adjusted percentage of first-time detections at the six dams was 11.8%, with averages of 6.5, 2.9, 1.6, 0.7, 0.0, and 0.0% at Lower Granite, Little Goose, Lower Monumental, McNary, John Day, and Bonneville Dams, respectively. The proportions of adjusted total fish detected at the six dams were 55.4, 24.9, 14.0, 5.7, 0.0, and 0.0% for Lower Granite, Little Goose, Lower Monumental, McNary, John Day, and Bonneville Dams, respectively. The overall detection rates at the four collector dams varied by stream of origin (Fig. 2 and Table 4), ranging from 6.3% of the Valley Creek fish to 28.9% of the Big Creek (lower) fish.

Due to rounding, total adjusted numbers for daily detections of fish from combined streams in Appendix Tables 23-26 will not add up to the total adjusted detections for individual streams in Table 4.

Table 4. Summary of first-time detections and detections adjusted for spill of PIT-tagged wild spring/summer chinook salmon smolts from Idaho at four dams from April to October 1995 See Table t for numbers released.

Stream	Detections											
	Lower Granite Dam			Little goose dam			Lower monumental dam			McNary Dam		
	Unadjusted	Adjusted		Unadjusted	Adjusted		Unadjusted	Adjusted		Unadjusted	Adjusted	
		N	%		N	%		N	%		N	%
Bear Valley Creek	73	82	5.6	18	20	1.4	14	14	1.0	2		0.2
Elk Creek	75	80	5.3	28	31	2.0	16	17	1.1	3	6	0.4
Sulphur Creek	56	61	8.4	34	41	5.0	19	21	2.9	3	5	0.7
Marsh Creek	103	116	7.4	35	46	2.9	21	23	1.5	9	17	1.1
Cape Horn Creek	84	95	6.6	39	47	3.3	19	21	1.5	6	12	0.8
Valley Creek	50	52	3.3	24	24	1.5	19	19	1.2	2	3	0.2
camas creek	59	66	4.3	32	40	2.6	25	27	1.8	6	12	0.8
Loon Creek	83	95	9.8	40	52	5.4	30	33	3.4	2	4	0.4
Herd Creek	36	38	7.1	17	21	3.9	10	11	2.1	2	3	0.6
1. fork Salmon River	69	71	7.2	16	20	2.0	6	6	0.6	4	7	0.7
Big Creek (upper)	50	56	7.4	23	25	3.3	16	17	2.2	4	8	1.1
S Fork Salmon River	78	88	5.6	23	27	1.7	19	20	1.1	6	11	0.7
Big Creek (lower)	112	121	16.6	37	50	6.9	22	26	3.6		13	18
Rush Creek	2	2	1.3		1	6.7	1	1	6.7	0	0	0.0
W Fork Chamberlain Creek	43	48	5.2	21	24	2.6	7	8	0.9	2		0.3
Chamberlain Creek	14	15	6.2	11	14	5.8	5	5	2.1	0	0	0.0
Secesh River	86	92	5.9	44	52	3.3	28	31	2.0	8	14	0.9
Lake Creek	24	26	6.4	10	16	1.5	4	4	1.0	1	2	0.5
Totals or averages	1,097	1,204	6.5	449	541	2.9	280	304	1.6	67	123	0.7

* One additional fish from this stream had a first-time detection at John Day Dam

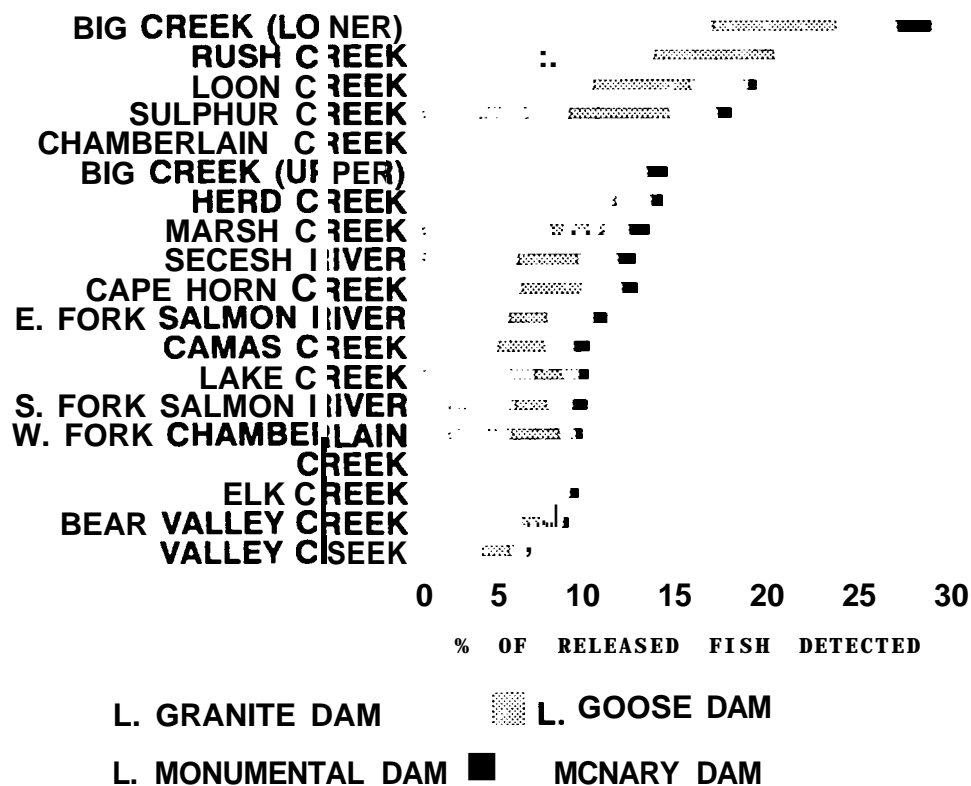


Figure 2. Percent (adjusted for spill) of PIT-tagged wild spring/summer chinook salmon smolts detected at Lower Granite, Little Goose, Lower Monumental, and McNary Dams in 1995.

From 1990 to 1993, the vast majority of chinook salmon parr collected in Idaho were collected by electrofishing. Therefore, we could not statistically compare subsequent detection rates at dams for released fish following electrofishing or seining. In 1994, in the South Fork of the Salmon River and Valley Creek, enough fish were collected by both collection methods to conduct a statistical analysis which compared the two methods with respect to detections at dams in 1995. We found no significant difference in detections (unadjusted) at the dams for fish released the previous year following collection by electrofishing (7.2%) or seining (6.9%) ($P > 0.05$).

To ascertain how water temperature may have affected study fish during tagging, we examined the differences among groups in combined detection rates at dams the following spring (Appendix Table 22). The detection rate (unadjusted) of groups from all streams when tagging began with water temperatures 13°C or greater was 10.5%. When tagging began at temperatures less than 13°C , the detection rate was 10.1%. A two-sample Z-test showed no significant difference between these percentages ($P > 0.05$).

We also analyzed the detection rates on fish from groups released at different water temperatures. The detection rate of groups released when water temperatures were 13°C or greater was 10.0%. When water temperatures were less than 13°C , the detection rate was not significantly different (10.6%) ($P > 0.05$).

When we added tagging and release water temperatures, we found the detection rate for groups tagged and released with additive water temperatures of 25°C or greater was 10.3%. With additive water temperatures less than 25°C , the detection rate was 10.2%. This difference was not statistically significant ($P > 0.05$).

At release, the average fork length for all fish was 65 mm. However, for fish detected the following spring at the dams, the average fork length at release was 67 mm. A chi-square comparison of the length distributions showed these lengths were significantly different ($P < 0.0001$). Figure 3 shows the relationship between length at release and eventual detection at the dams. Fish 63 mm or smaller were detected at a significantly lower rate than expected ($P < 0.0001$), whereas fish 65-84 mm were detected at a significantly higher rate than expected ($P < 0.03$).

We also found a significant difference in fork lengths at time of release between fish that migrated through the dams in April and May and fish that migrated after May ($P < 0.0001$): fish migrating after May were on average 6 mm smaller when released than fish migrating before this time. These data suggest that fish size may be an important factor influencing migration timing or overwintering location with respect to proximity to the first dam.

During a portion of the migration season at McNary Dam, we tested the new PIT-tag detection diversion system. The diverted fish were scanned for PIT tags, weighed, and measured. This allowed us to collect information on fork length and weight gains for wild fish from time of tagging and release until recovery at the dam (Table 5). The average gains in fork length and weight were 42.2 mm and 10.0 g, respectively, over an average of 284.1 day.

Of a total of 20 (including fish detected at previous dams) wild PIT-tagged chinook salmon smolts detected at John Day and Bonneville Dam's sub-sampling systems, 8 were measured and grew an average of 45 mm (range 31-67 mm), over an average of 288.8 days between measurements.

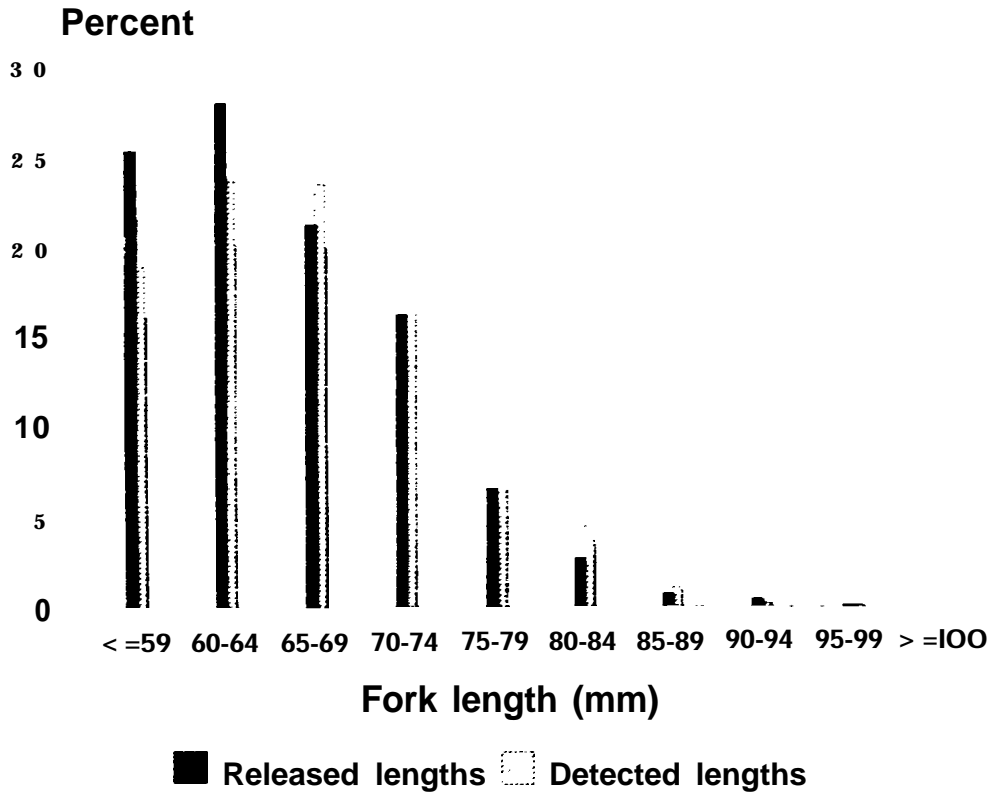


Figure 3. Percent, by fork length increments, of PIT-tagged wild spring/summer chinook salmon parr released in Idaho streams in 1994 and percent of fish detected for these length increments at Lower Granite, Little Goose, Lower Monumental, McNary, and John Day Dams in spring and summer 1995.

Table 5. Increases in length (mm) and weight (g) for wild spring/summer chinook salmon from tagging in summer 1994 to recovery at McNary Dam in spring 1995 Tagged fish were recovered during PIT-tag detection/diversion tests.

Stream	length increase			Weight increase			Average days
	N	Average	Range	N	Average	Range	
Rear Valley Creek	2	44.0	43.0 - 45.0	1	12.2	-----	301.2
Elk Creek	7	42.6	35.0 - 54.0	3	to. 1	7.6 - 11.9	292.2
Sulphur Creek	6	39.5	34.0 - 49.0	2	6.5	6.5 - 6.5	296.3
Cape Horn Creek	3	46.7	42.0 - 52.0	1	11.6	-----	299.2
Marsh Creek	8	41.0	20.0 - 54.0	3	11.3	9.9 - 12.6	289.8
Valley Creek	1	41.0	-----	--	----	-----	300.0
Camas Creek	6	45.2	23.0 - 56.0	2	12.0	to.3 - 13.6	281.1
Loon Creek	10	45.5	31.0 - 60.0	4	8.2	6.3 - 9.8	287.0
E. Fork Salmon River	5	40.0	32.0 - 49.0	4	10.3	7.6 - 15.1	271.0
Big Creek (upper)	2	40.0	42.0 - 50.2	1	11.7		288.2
Big Creek (tower)	0	38.2	31.0 - 41.0		----		263.8
Chamberlain Creek	4	38.8	33.0 - 44.0			-----	265.9
W. Fork Chamberlain Creek	1	47.0	-----				275.7
Rush Creek	1	32.0	-----	--			262.7
Totals or averages	62	42.2	23.0 - 60.0	21	10.0	6.3 - 15.1	284.1

MIGRATION TIMING AT DAMS

Migration timing at dams was calculated by totaling the adjusted number of detections in 3-day intervals and dividing by the total adjusted detections during the season. This method was applied to detection data for fish from individual and combined streams. Timing of smolt migrations from individual streams was calculated at Lower Granite Dam (Fig. 4). while migration timing for smolts from all Idaho streams combined was calculated at all four collector dams (Fig. 5).

Fish from Big (lower)/Rush Creeks in the Middle Fork of the Salmon River drainage, Secesh River in the South Fork of the Salmon River drainage. East Fork Salmon River and Herd Creek in the upper Salmon River. and the Lostine River and Imnaha River (upper) in Oregon had the earliest timings at Lower Granite Dam (Fig. 4 and Table 6). Over 50% of the fish from these streams passed the dam by 3 May. and most peak passage dates for fish from these streams occurred in April (Appendix Tables 12A, 13A, 16A, 17A, 20A, and Fig. 4). Fish from East Fork of the Salmon River had the earliest passage period of all streams. while fish from Big (lower)/Rush Creeks had an early and the most compressed passage period at the dam.

Fish from Bear Valley, Elk, Marsh, Cape Horn, Loon, and Camas Creeks in the Middle Fork of the Salmon River drainage. from the West Fork Chamberlain/Chamberlain Creeks tributaries of the main Salmon River. from Lake Creek and the South Fork of the Salmon River in the South Fork drainage. and from Catherine Creek in Oregon showed a later passage period at Lower Granite Dam than the aforementioned streams (Fig. 4 and Table 6). The 50% passage dates for fish from these streams ranged from 9 to 19 May. Peak passage dates

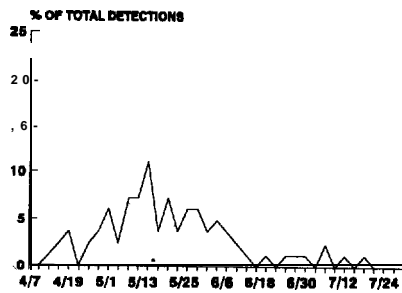
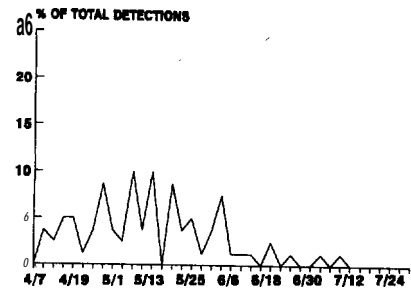
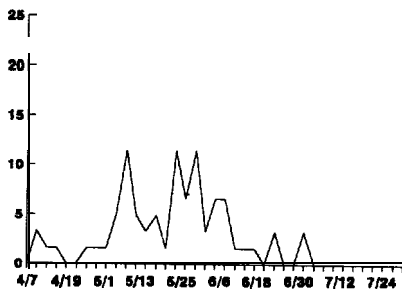
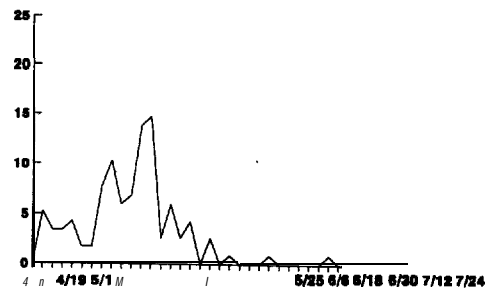
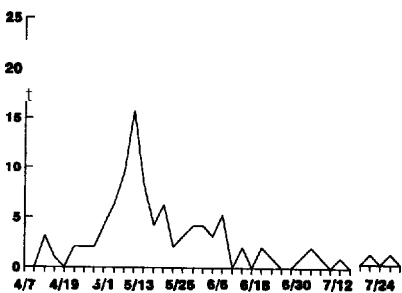
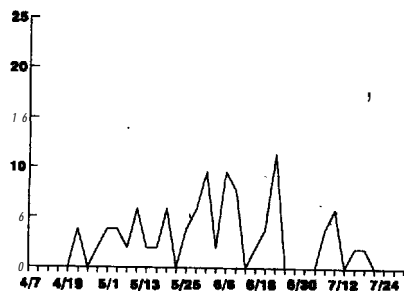
BEAR VALLEY CREEK**ELK CREEK****SULPHUR CREEK****MARSH CREEK****CAPE HORN CREEK****VALLEY CREEK**

Figure 4. The migration timing (adjusted for spill) at Lower Granite Dam in 1995 of PIT-tagged wild spring/summer chinook salmon smolts from individual or combined streams in Idaho and Oregon.

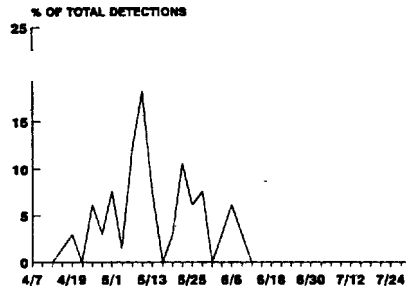
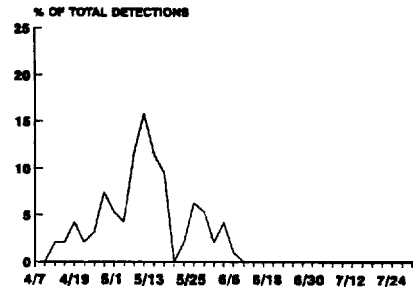
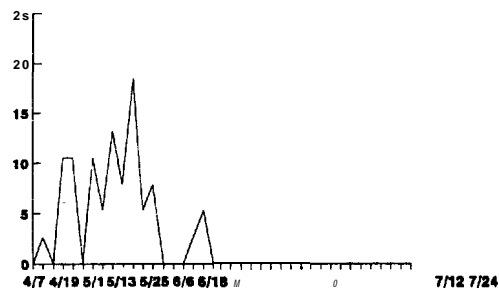
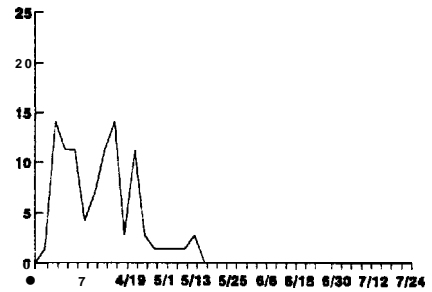
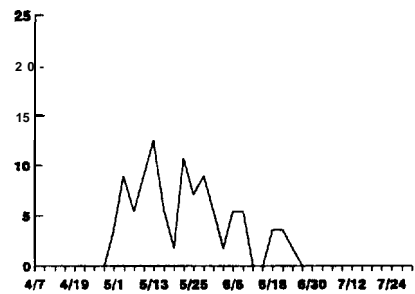
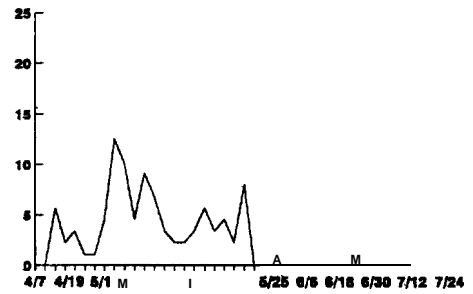
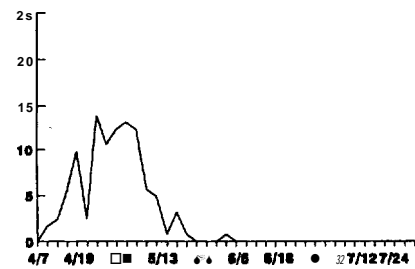
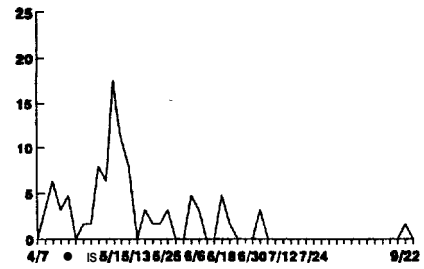
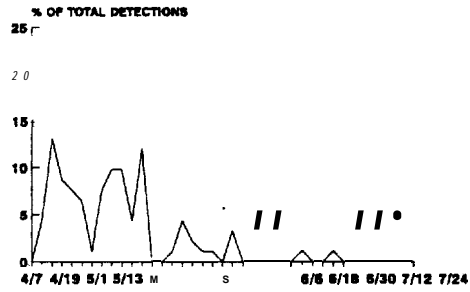
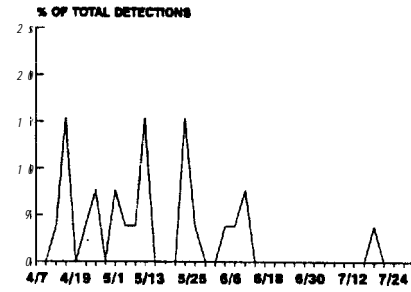
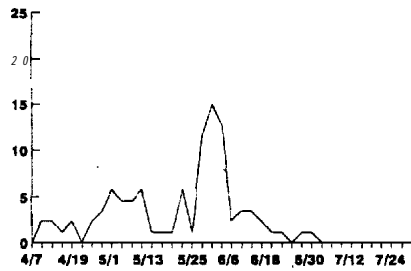
CAMAS CREEK**LOON CREEK****HERD CREEK****EAST FORK SALMON RIVER****BIG CREEK (UPPER)****SOUTH FORK SALMON RIVER****BIG CREEK (LOWER)/
RUSH CREEK****WEST FORK CHAMBERLAIN
/CHAMBERLAIN CREEKS**

Figure 4. Continued.

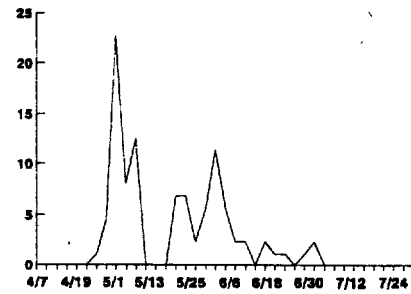
SECESH RIVER



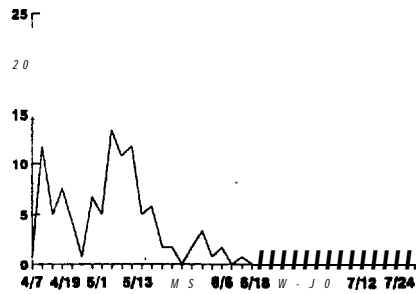
LAKE CREEK

GRANDE RONDE RIVER
(UPPER)

CATHERINE CREEK



LOSTINE RIVER



IMNAHA RIVER (UPPER)

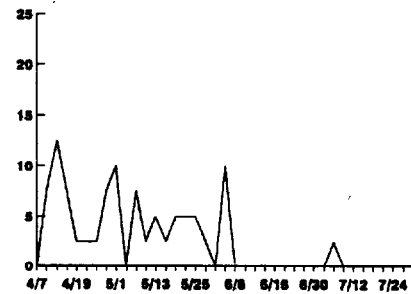
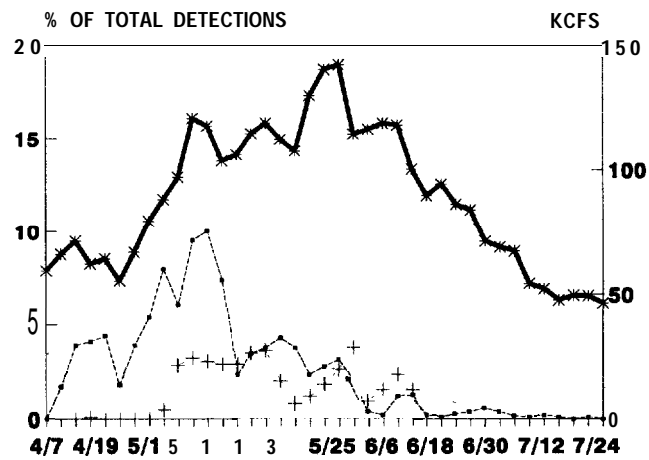


Figure 4. Continued.

Lower Granite Dam



Little Goose Dam

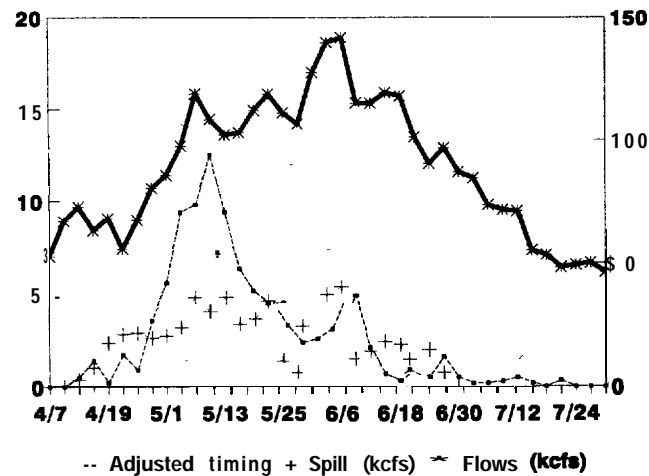
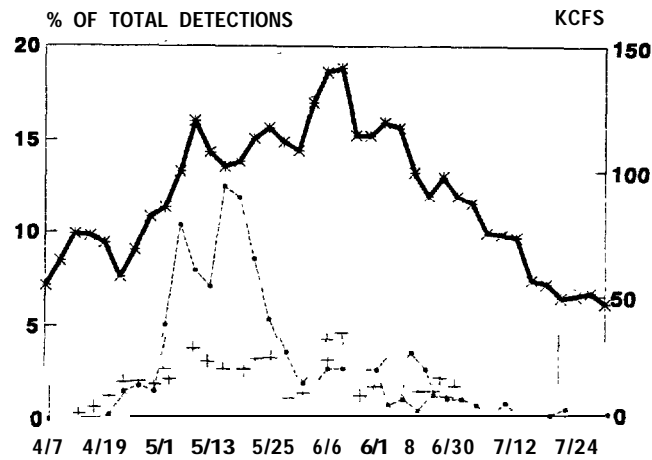


Figure 5. The overall migration timing of PIT-tagged wild spring/summer chinook salmon smolts at Lower Granite, Little Goose, Lower Monumental, and McNary Dams in 1995, with associated river spill and flows at these dams. Data represent detections from all Idaho streams combined by 3-day intervals and average river spill and flows at the dams over the same time periods.

Lower Monumental Dam



McNary Dam

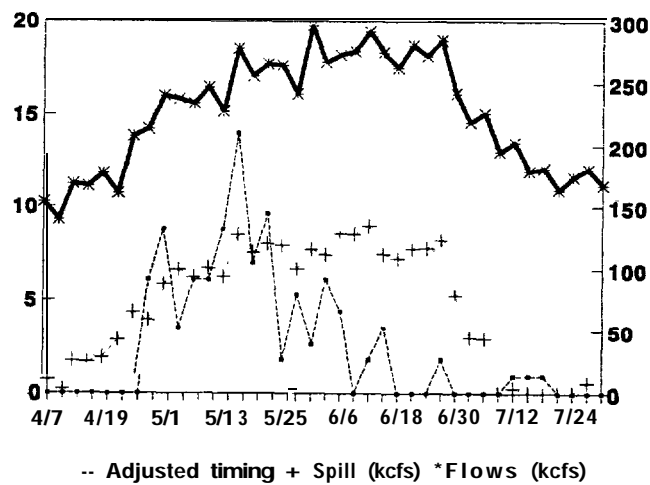


Figure 5. Continued.

Table 6. Historical and 1995 passage dates at Lower Granite Dam for PIT-tagged wild spring/summer chinook salmon smolts from streams in Idaho and Oregon.

Year	Passage dates at Lower Granite Dam			
	10%	50%	90%	Range
Bear Valley Creek				
1990	19 April	05 May	31 May	11 April - 18 July
1991	03 May	20 May	12 June	18 April - 23 June
1992	15 April	02 May	24 May	07 April - 28 June
1993	29 April	16 May	22 June	22 April - 27 July
1994	22 April	06 May	29 May	16 April - 15 July
1995	28 April	18 May	12 June	13 April - 20 July
Elk Creek				
1990 ^a	—	-----	-----	-----
1991	03 May	20 May	16 June	25 April - 24 June
1992	11 April	30 April	28 May	05 April - 17 July
1993	02 May	16 May	11 June	21 April - 26 June
1994	23 April	04 May	21 May	18 April - 09 July
1995	18 April	11 May	05 June	10 April - 09 July
Sulphur Creek				
1990	18 April	30 April	31 May	11 April - 27 June
1991^b	-----	-----	-----	—
1992	16 April	03 May	23 May	10 April - 01 June
1993	28 April	16 May	12 June	24 April - 28 June
1994^b	-----	m-----	-----	-----
1995	02 May	23 May	09 June	11 April - 09 July

Table 6. Continued.

Year	Passage dates at Lower Granite Dam			
	10%	50%	90%	Range
Cape Horn Creek				
1990^b	-----	-----	- - -	
1991	24 April	16 May	28 May	19 April - 06 June
1992	12 April	28 April	30 May	10 April - 01 June
1993	08 May	19 May	26 June	05 May - 01 July
1994^b	-----	-----	-----	-----
1995	29 April	14 May	19 June	14 April - 28 July
Marsh Creek				
1990	17 April	29 April	31 May	09 April - 01 July
1991	26 April	20 May	09 June	17 April - 18 June
1992	17 April	07 May	02 June	10 April - 13 July
1993	29 April	15 May	27 May	24 April - 10 August
1994	23 April	04 May	18 May	16 April - 08 August
1995	17 April	09 May	24 May	11 April - 08 July
Valley Creek				
1989	24 April	14 May	12 June	09 April - 17 June
1990	16 April	08 May	05 June	12 April - 29 June
1991	11 May	20 May	20 June	21 April - 13 July
1992	15 April	30 April	27 May	13 April - 04 June
1993	30 April	16 May	02 June	24 April - 06 June
1994	24 April	04 May	03 June	22 April - 09 June
1995	04 May	02 June	08 July	22 April - 18 July
Camas Creek				
1993	03 May	16 May	27 May	24 April - 24 June
1994	30 April	15 May	26 May	24 April - 11 July
1995	27 April	12 May	05 June	17 April - 11 June

Table 6. Continued.

Year	Passage dates at Lower Granite Dam			
	10%	50%	90%	Range
Loon Creek				
1993	05 May	12 May	17 May	03 May - 25 June
1994	29 April	10 May	24 May	22 April - 07 June
1995	23 April	11 May	28 May	13 April - 07 June
East Fork Salmon River				
1989	22 April	03 May	18 May	07 April - 08 June
1990^b	-----	-----	-----	-----
1991	22 April	09 May	26 May	16 April - 20 June
1992	13 April	21 April	16 May	10 April - 03 June
1993	25 April	06 May	18 May	22 April - 01 June
1994	22 April	28 April	17 May	20 April - 25 May
1995	14 April	28 April	10 May	11 April - 27 May
Herd Creek				
1992	14 April	20 April	10 May	13 April - 18 May
1993	26 April	30 April	18 May	26 April - 31 May
1994 ^a	-----	-----	-----	-----
1995	18 April	03 May	14 May	11 April - 28 May
South Fork Salmon River				
1989	25 April	13 May	14 June	16 April - 20 June
1990^b	-----	-----a--	-----m	-----
1991	20 April	16 May	10 June	17 April - 13 July
1992	14 April	29 April	27 May	07 April - 27 July
1993	29 April	16 May	02 June	26 April - 28 June
1994	27 April	15 May	28 June	22 April - 09 July
1995	20 April	10 May	10 June	13 April - 13 July

Table 6. Continued.

Year	Passage dates at Lower Granite Dam			
	10%	50%	90%	Range
Big Creek (upper)				
1990	27 April	30 May	22 June	17 April - 18 July
1991	18 May	10 June	26 June	26 April - 01 July
1992	22 April	08 May	03 June	15 April - 26 June
1993	08 May	18 May	26 May	26 April - 15 June
1994	03 May	19 May	19 July	25 April - 30 August
1995	05 May	23 May	09 June	02 May - 26 June
Big Creek (lower)/Rush Creek				
1993	24 April	29 April	13 May	21 April - 16 May
1994	23 April	29 April	11 May	21 April - 15 June
1995	19 April	01 May	14 May	11 April - 05 June
West Fork Chamberlain Creek				
1992 ^a	15 April	26 April	03 June	12 April - 24 June
1993	28 April	15 May	23 June	23 April - 22 July
1994 ^a	24 April	01 May	05 July	24 April - 04 September
1995^c	16 April	09 May	20 June	12 April - 22 September
Secesh River				
1989	20 April	27 April	09 June	09 April - 19 July
1990	14 April	22 April	07 June	10 April - 13 July
1991	20 April	27 April	14 June	13 April - 20 July
1992	13 April	29 April	04 June	05 April - 03 July
1993	26 April	16 May	16 June	22 April - 15 July
1994	22 April	26 April	11 July	21 April - 07 August
1995	14 April	01 May	24 May	10 April - 10 July

Table 6. Continued.

Year	Passage dates at Lower Granite Dam			
	10%	50%	90%	R a n g e
Lake Creek				
1989	23 April	02 May	16 June	12 April - 01 July
1990^b		-----	-----	-----
1991^b		--w-w--	--w----	-----
1992^b		-----	-e-----	
1993	23 April	09 May	22 June	22 April - 25 June
1994	21 April	28 April	19 May	20 April - 24 June
1995	17 April	10 May	10 June	14 April - 20 July
Catherine Creek				
1991	01 May	14 May	08 June	17 April - 23 June
1992	16 April	01 May	21 May	09 April - 29 June
1993	06 May	18 May	05 June	29 April - 26 June
1994	25 April	11 May	20 May	13 April - 26 July
1995	01 May	19 May	09 June	26 April - 02 July
Grande Ronde River (upper)				
1989	12 May	06 June	19 June	27 April - 22 July
1990^b	-----	---m--e-	-----	--em-----
1991^b	-----	---m-e-	----e	-----
1992^b	-----	-----	w - c - -	-----
1993	05 May	16 May	25 May	23 April - 20 June
1994	28 April	23 May	07 July	23 April - 29 August
1995	27 April	29 May	12 June	12 April - 01 July

Table 6. Continued.

Year	Passage dates at Lower Granite Dam			
	10%	50%	90%	Range
Imnaha River (lower)				
1989	11 April	30 April	11 May	04 April - 05 June
1990	10 April	18 April	09 May	05 April - 27 May
1991	20 April	01 May	13 May	14 April - 15 May
1992	10 April	21 April	03 May	06 April - 21 May
1993^b		-----	-----	-----
1994^b		-----	-----	-----
1995^b	-----	-----	-----	-----
Imnaha River (upper)				
1993	24 April	14 May	28 May	15 April - 23 June
1994	24 April	08 May	09 June	20 April - 11 August
1995	13 April	02 May	03 June	10 April 07 J u l y
Lostine River				
1990 ^c	-----	-----	-----	-----
1991	29 April	14 May	26 May	20 April -09 July
1992	16 April	30 April	11 May	12 April - 02 June
1993	23 April	03 May	'17 May	17 April 01 June
1994	22 April	30 April	16 May	19 April -07 June
1995	12 April	02 May	17May	05 April - 09 June

^a Insufficient numbers detected to estimate timing.

^b No fish were tagged for this migration year.

^c Includes fish from Chamberlain Creek.

for fish from these streams were distributed from early to late-May (Appendix Tables 4A, 5A, 7A, 8A, 10A, 11A, 15A, 18A, 19A, 21A, and Fig. 4).

Fish from Big Creek (upper) and Sulphur Creek in the Middle Fork of the Salmon River drainage, Valley Creek in the upper Salmon River, and the Grande Ronde River (upper) in Oregon had the latest passage periods at Lower Granite Dam (Fig. 4 and Table 6). The 50% passage dates for fish from these streams ranged from 23 May to 2 June. Peak passage dates for fish from these streams occurred over an extended period from early May to late June (Appendix Tables 6A, 9A, 14A, and Fig. 4). Fish from both Valley and West Fork Chamberlain/Chamberlain Creeks had the most protracted passage period at the dam. Valley Creek fish had the latest passage period of all streams at the dam.

Passage distributions for wild chinook salmon smolts from Idaho streams were quite variable at Lower Granite Dam in 1995. Analyses of passage distributions were potentially biased due to low numbers and the spill program, even though detection numbers were adjusted for spill. We used the Student-Newmann-Keuls (SNK) multiple comparison method to make between-stream comparisons for each statistic. Oregon streams were not included in this analysis. There were many significant ($P < 0.05$) timing differences for the 10, 50, and 90% passage distributions at the dam between streams using the median of the individual stream bootstrap standard errors. Overall, for the middle 80% passage time in days at the dam, Lake Creek and West Fork Chamberlain/Chamberlain Creeks fish had significantly longer passage times than Big (lower)/Rush Creeks, East Fork of the Salmon River, or Herd Creek fish ($P < 0.05$). Valley Creek fish had significantly longer passage time at the dam than Big (lower)/Rush Creeks, East Fork of the Salmon River, Herd Creek, Loon Creek,

Marsh Creek, Big Creek (upper), Sulphur Creek, Camas Creek, or the Secesh River fish ($P < 0.05$).

Timing of smolts from individual streams in Idaho is not presented here for Little Goose, Lower Monumental, McNary, John Day, and Bonneville Dams. See Appendix Tables 4A-21B for this information.

We combined all detections of wild fish from Idaho streams at each of the four collector dams and compared the timing at each dam with river flows during the same periods (Fig. 5). Overall passage occurred between early April and late September at Lower Granite Dam, with the middle 80% passage from late April to early June (Table 7). The peak passage date was 9 May, which coincided with an increasing flow period, but prior to peak flows at this dam in early June (Appendix Table 23). The middle 80% passage of wild fish occurred between early May and the first two weeks of June for Little Goose, Lower Monumental, and McNary Dams (Table 7). Peak passage periods for fish at Little Goose, Lower Monumental, and McNary Dams coincided with moderate to high river flows during mid-May; these peaks occurred prior to peak flows at these dams, which extended from late May to early June (Fig. 5 and Appendix Tables 24-26).

DIEL TIMING AT JUVENILE FISH FACILITIES

Diel timings at collector dams were based on detections of fish exiting the fish and debris separators at the juvenile fish facilities. Timing was calculated by totaling detections of combined populations of wild fish for each of the 24 daily hours through the migration and dividing by the total detected for the migration (Fig. 6).

Table 7. Passage-dates at Lower Granite, Little Goose, Lower Monumental, and McNary Dams for combined populations of PIT-tagged wild spring/summer chinook salmon smolts from Idaho in 1995.

Site	Passage periods at dams			
	10%	50%	90%	Range
Lower Granite Dam	19 April	10 May	6 June	10 April - 22 September
Little Goose Dam	1 May	14 May	11 June	13 April - 7 September
Lower Monumental Dam	3 May	16 May	11 June	19 April - 27 August
McNary Dam	2 May	18 May	6 June	28 April - 2 July

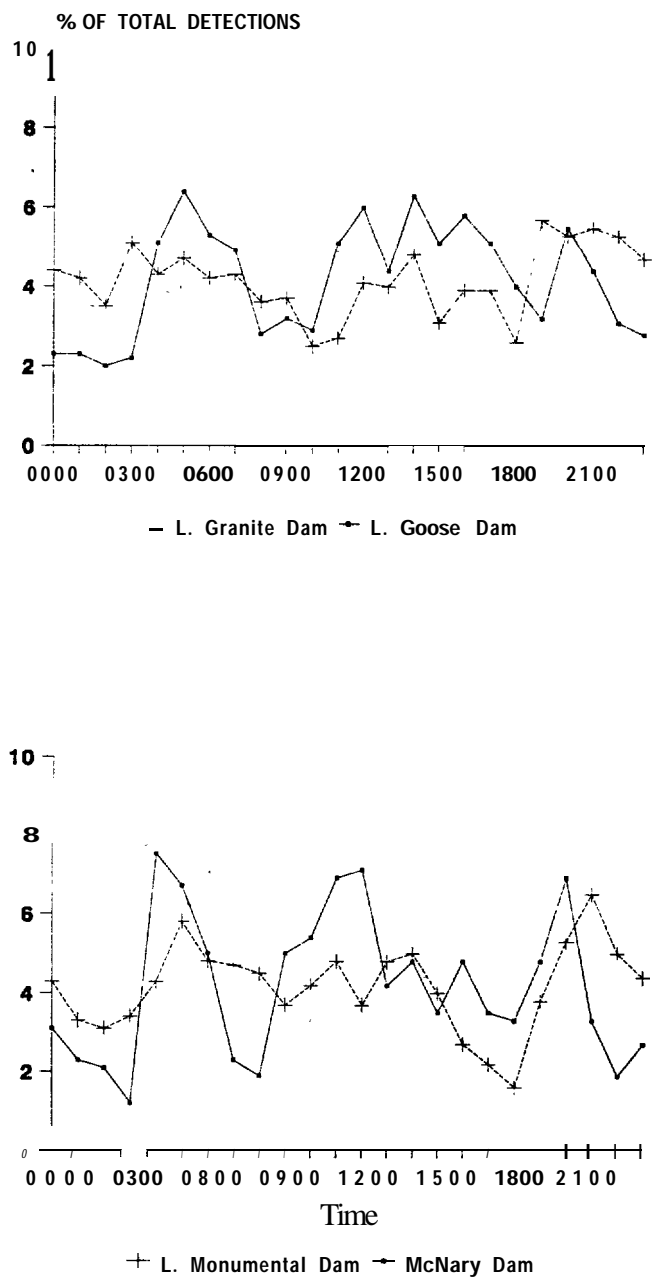


Figure 6. Diel passage timing of all PIT-tagged wild chinook salmon smolts from Idaho at Lower Granite, Little Goose, Lower Monumental, and McNary Dams in 1995. Diel timing was calculated on an hourly basis for fish exiting the fish and debris separators at the dams during the migration.

At Lower Granite Dam, significantly more wild smolts exited the separator from 1800 to 0600 h (mostly nighttime hours, 55.2%) than exited from 0600 to 1800 h (daytime hours, 44.8%) ($P < 0.0007$). When we examined passage in 6-hour periods, the lowest numbers of fish exited the separator from 0600 to 1200 h, and the highest numbers exited from 1800 to 0000 h. Using chi-square tests, we found significantly fewer fish detected from 0600 to 1200 h than from 0000 to 0600 h or from 1800 to 0000 h, and significantly fewer fish were detected from 1200 to 1800 h than from 1800 to 0000 h ($P < 0.002$). Peak passage from the separator occurred in early morning and evening.

At Little Goose Dam, significantly more wild smolts exited the fish and debris separator from 0600 to 1800 h (56.7%) than exited from 1800 to 0600 h (43.3%) ($P < 0.0002$). The lowest numbers of fish exited the separator from 0000 to 0600 h, and the highest numbers exited from 1200 to 1800 h. Significantly more fish were detected from 1200 to 1800 h than for the other three 6-hour time periods ($P < 0.0001$). Peak passage times were early morning and mid-afternoon.

At Lower Monumental Dam, although more wild smolts exited the fish and debris separator from 1800 to 0600 h (50.7%) than exited from 0600 to 1800 h (49.3%), the difference was not significant ($P > 0.6$). The lowest numbers of fish exited from 1200 to 1800 h and the highest numbers exited from 0600 to 1200 h; however, there were no significant differences between the four time periods ($P > 0.2$). The major peak passage period was from 2100 to 2200 h.

At McNary Dam, more wild smolts exited the fish and debris separator from 0600 to 1800 h (54.3%) than exited from 1800 to 0600 h (45.7%), but the difference was not

significant ($P > 0.05$). Equally low numbers of fish exited from 1800 to 0000 h and 0000 to 0600 h. The highest numbers exited from 1200 to 1800 h. There were no significant differences between the four time periods ($P > 0.2$). Peak passage periods occurred in early morning, midday, and evening.

ENVIRONMENTAL INFORMATION

One goal of this study is to identify relationships between environmental factors where wild parr reside and subsequent migration timing of smolts the following spring at downstream traps and dams. Since 1993, NMFS has worked with Pacific Northwest Laboratories (PNL) through Bonneville Power Administration funding to obtain environmental data.

In 1993, PNL personnel conducted an extensive review of historical and current environmental information collected in Idaho study streams. In November and December 1993, they installed environmental monitoring systems in the Middle Fork of the Salmon River near Thomas Creek, Marsh Creek, Valley Creek, the upper Salmon River near Sawtooth Hatchery, and the Salmon River below its confluence with the Yankee Fork. Monitors will be installed in other study streams during the next few years. Achord et al. (1995b) provided additional information about stream monitors.

Appendix Tables 27-3 1 provide a summary of environmental information collected at these 5 sites from August 1994 to July 1995.

ADULT RETURNS FROM 1989-1993 SMOLT MIGRATIONS

Although adult return information is not an objective of this study, there is considerable interest concerning the return of PIT-tagged adult wild spring/summer chinook salmon to the Snake River. Of the wild spring/summer chinook salmon PIT tagged and released for the 1989 through 1993 smolt migrations, 20 were detected as adults at the adult trap at Lower Granite Dam through 1995. Of the 20 adults, 12 had been transported as smolts from Lower Granite Dam to below Bonneville Dam, 4 had been transported as smolts from Little Goose Dam to below Bonneville Dam, and 4 had never been detected at any dam during previous smolt migrations.

DISCUSSION

Mortalities associated with collection and tagging in 1994 were comparable to those in earlier years (Matthews et al. 1990, 1992; Achord et al. 1992, 1994, 1995a, 1995b).

With the addition of juvenile migrant fish traps on Marsh Creek and South Fork of the Salmon River, more PIT-tagged wild fish were monitored at traps than in previous years. At Marsh Creek trap; where the vast majority of PIT-tagged wild fish were monitored (at traps), we compared the overall detection rate (unadjusted) at the dams for released fish in the summer (10.7%), to that of fish detected and released from the trap in fall (18.8%). This 75.7% increase in detection rate at the dams for released previously PIT-tagged fish detected at traps in the fall may indicate a higher survival for known fall migrants and/or reflect mortality in the stream over an average of 51 days from summer to fall in 1994. Kiefer and Lockhart (1993 and 1994) observed a 100% increase in overall detection rates at the dams the

following springs for PIT-tagged chinook salmon emigrating from the upper Salmon River in fall 1990 and 1991 (9.5 and 7.1%), compared to the overall detection rates at the dams for chinook salmon parr PIT tagged in summer 1990 and 1991 (4.7 and 3.5%).

For data collected over the last 7 years, length-distribution curves showed that, generally, wild fish released and subsequently detected at dams are slightly larger than fish that are released but not detected. The reason for this slight difference in size is unknown. However, it appears that larger fish, tagged and released the previous summers, survived slightly better and/or were guided slightly better into the collection systems at the dams than smaller fish.

Another consistent trend we 'have observed over the years is the difference in migration timing at dams with respect to size at tagging. Wild fish migrating in April and May were . significantly larger at release than fish migrating after May. This consistent trend suggests that size is an important factor related to either the initiation of smoltification or other life-history dynamics that affect the migrational timing of wild fish.

In 1995, the overall detection rate (adjusted) of wild fish at the four collector dams was lower than in 1993 (Achord et al. 1995a) or 1994 (Achord et al. 1995b). Densities of chinook salmon parr in all streams in 1994 were the highest since 1989. For example, in 1994, we collected 2.6 times more fish than in 1993 while sampling 29.6% less stream distance. In 1994 density-dependant effects may have contributed to the lower overall average detection rate at the dams in 1995. However, other factors, such as changes in spill patterns and fish guiding efficiencies (installation of some extended-length turbine intake screens), may have contributed to the difference in dam detection rates between the 2 years.

As observed in 1993 and 1994, fish from Big (lower)/Rush Creeks had the highest detection rate at the dams in 1995.

Average gains in fork length and weight observed for wild chinook salmon from time of release to recovery at McNary Dam, were similar to those observed at Lower Monumental, Little Goose, and Lower Granite Dams during previous studies (Matthews et al. 1992; Achord et al. 1992, 1995a, 1995b). The average length gain for, the eight wild fish measured at John Day and Bonneville Dams was similar to those measured at McNary Dam.

In 1995, as in 1992, 1993, and 1994, protracted passage distributions and small sample sizes at Lower Granite Dam made it difficult to statistically quantify small differences in arrival timing among fish from different streams. Since the timing of fish from all Idaho streams (excluding Oregon streams) tended to be early and very protracted at the dam in 1992, there were no statistically significant timing differences among streams for that year. Timing of fish from most Idaho streams was late in 1993, with more fish passing the dam during a shorter period, so it was possible to detect some significant timing differences among fish from different streams in that year. In 1994, the middle 80% arrival timing distributions of fish from Idaho streams were quite variable, ranging from 18 to 80 days; therefore, some significant timing differences were detected. In 1995, the middle 80% arrival timing distributions of fish from Idaho streams were also quite variable, ranging from 25 to 65 days, and several significant timing differences were observed. Fish from the East Fork of the Salmon River had the earliest passage distribution, while Valley Creek fish displayed the latest passage distribution at the dam. Table 6 shows the variability in passage dates at Lower Granite Dam for individual streams in Idaho and Oregon over the years.

In 1995, peak detections of wild fish occurred on 9 May, and did not coincide with peak river flows at Lower Granite Dam. However, the peak passage period around 9 May, at the dam did coincide with increasing river flows. This period of medium-to-high flows was followed by high flows throughout the remaining month of May, with flows peaking in early June at the dam. In the 6 years before 1995, passage timing of wild smolts at this dam has been highly variable and generally independent of river flows before mid-May (Fig. 7). In contrast, peak passage of wild fish after mid-May has coincided well with periods of peak river flow at this dam before 1995. It appears the sustained high flows from mid-May to early June moved wild fish through this dam in a more uniform fashion than in previous years, and by the time peak flows occurred on 6 June, 90% had passed the dam. Raymond (1979) showed that the peaks of migration for the composite population of spring and summer chinook salmon smolts (mostly wild) passing Ice Harbor Dam from 1964-1969 preceded the periods of maximum river discharge in most years. During these years, fish passage peaked between 26 April and 13 May. With respect to river flow, our observations match the results of Raymond for wild fish migrating before mid-May.

Annual overall climatic variation is emerging as an important factor controlling overall timing of wild spring/summer chinook salmon smolts at Lower Granite Dam. Figures 7 and 8 give a perspective on timing of combined populations (Idaho and Oregon) of wild spring/summer chinook salmon smolts from 1989 through 1995 at this dam. In the colder-than-normal years of 1989, 1991, and 1993, 50% of all wild fish had passed the dam by mid-May, while 90% passed by mid-June (except in 1993, when high flows moved 90% through the dam by the end of May). In the warmer-than-normal years of 1990, 1992, and 1994, 50%

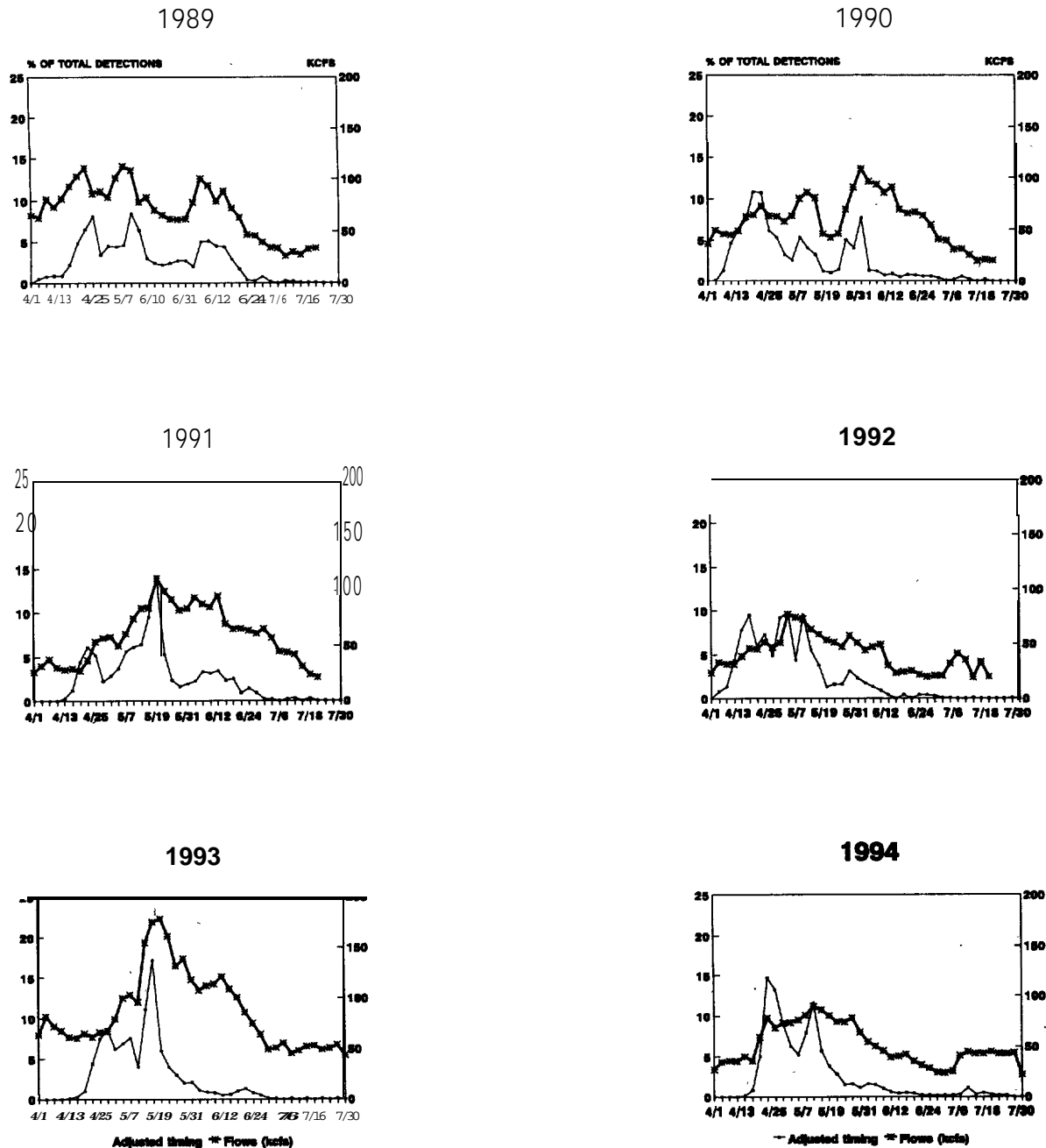


Figure 7. A historical perspective of migration timing (adjusted in spill years) of wild spring/summer chinook salmon smolts at Lower Granite Dam 1989-1995, with associated river flows at the dam. Data represent PIT-tag detections from Idaho and Oregon streams combined by 3-day intervals and average river flows at the dam over the same time periods.

1995

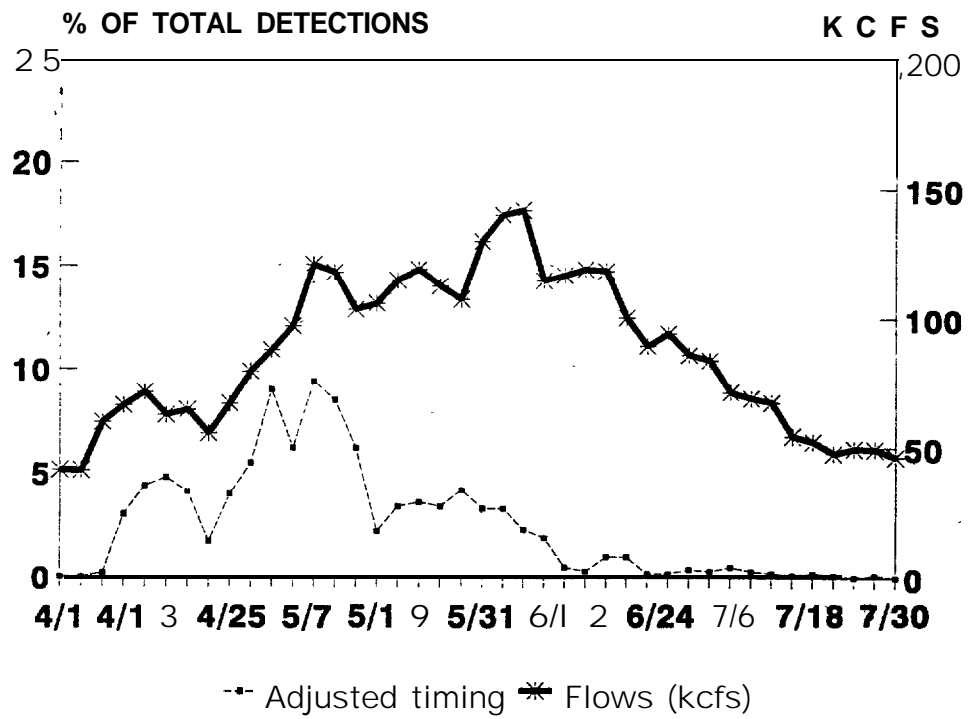


Figure 7. Continued.

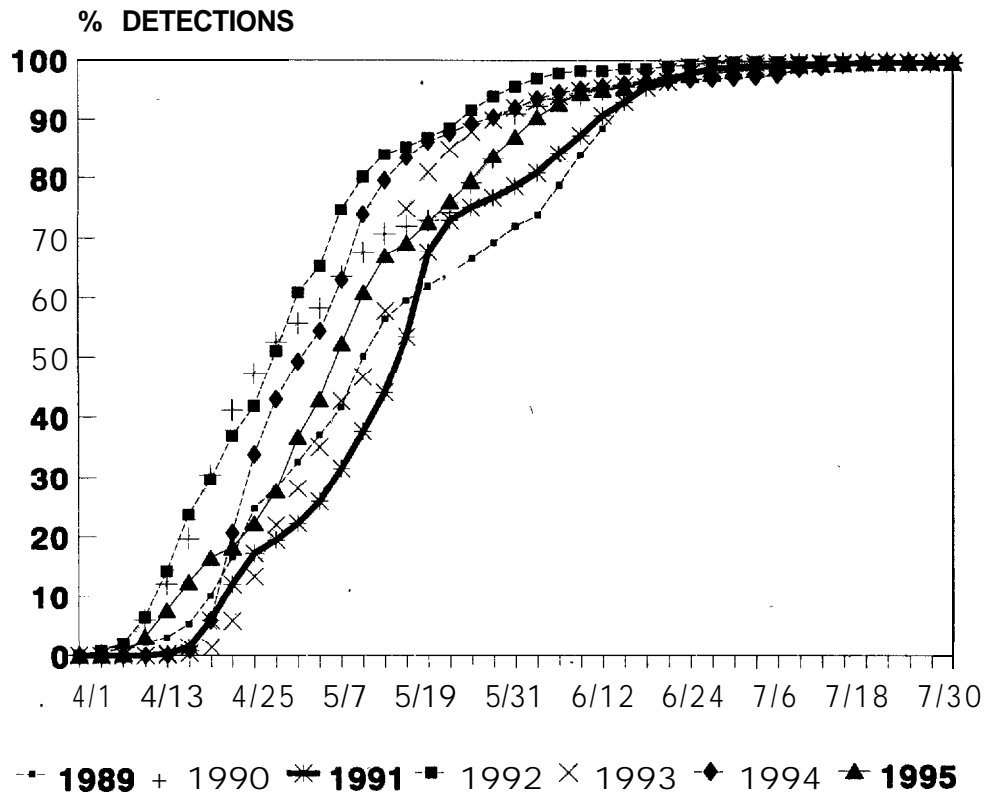


Figure 8. Cumulative percentages of total detections (adjusted for spill) of PIT-tagged wild spring/summer chinook salmon smolts detected at Lower Granite Dam, 1989-1995. Data represent PIT-tag detections from Idaho and Oregon streams combined by 3-day intervals.

of all wild fish passed this dam from 29 April to 4 May, and 90% passed by the end of May. Over these 6 years, we see a consistent 2-week shift in timing of wild fish at this dam between relatively warm and relatively cold years. In 1995, we see intermediate passage dates of 9 May and 5 June for the 50 and 90% passage dates, respectively, for these combined wild populations (Fig. 8). In 1995, we experienced near-normal weather conditions in late winter and early spring. Raymond (1979) cited water temperature as one of the most important factors for triggering the downstream movements of hatchery-reared and wild chinook salmon smolts in spring. He also noted that the latest migrations occurred in years when runoff was delayed by cold weather.

In 1992 and 1993, peak detections of wild fish at the collector dams below Lower Granite Dam coincided well with peak river flows. We were unable to determine whether the increased river flow moved these groups of fish through the reservoirs or were simply coincidental with their arrival at the dams. Since peak detections at these dams have consistently occurred nearly simultaneously with increased flow, it seemed likely that the fish were near the dams and were moved through them rapidly by the increased flow. However, this did not apparently occur in 1994. Peak detections at the lower collector dams did not coincide well with peak flows. In fact, peak flows at these dams coincided with significant decreases in wild fish detections, even though detections were adjusted for spill. We found no explanation for this difference. In 1995, peak detections of wild fish at these dams coincided with medium to high flows prior to peak flows.

After examining chinook salmon smolt passage timing at the dams over the last 7 years, it has become clear that flow is only one of several factors that influences passage timing.

Other factors, such as water temperature, turbidity, physiological development, variability in stock behavior, fish size, and other yet unknown conditions may equally affect wild smolt passage timing at dams.

In 1995, as was observed in 1992, 1993, and 1994, diel timings of wild fish exiting the fish and debris separators during the migration season varied among dams. In 1992, slightly more wild fish exited the separator at Lower Granite Dam during daytime hours, but in 1993, 1994, and 1995, significantly more wild fish exited the separator during mostly nighttime hours. At Little Goose Dam, the diel timing in 1995 was similar to timing observed in 1992 and 1993, with more wild fish exiting the separator during daytime hours. We also observed more wild fish exiting the separator during daytime hours in 1994, but the proportion was larger than in the other 3 years. At Lower Monumental Dam, more wild fish exited the separator during mostly nighttime hours in 1994 and 1995, but the difference was significant only in 1994. At McNary Dam, more wild fish exited the separator during daytime hours in all 4 years; however, in 1992 and 1994, a larger proportion exited the separator during daytime hours than in 1993 and 1995. We offer no explanation for diel timing differences observed at the dam separators over the years.

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APPENDIX TABLES

Appendix Table 1. Summary of tagging dates, number collected, tagged, released, and minimum, maximum, and average lengths and weights of wild chinook salmon parr PIT tagged in various Idaho streams in 1994.

Stream	Tagging dates	Number collected	Number tagged	Number released	Length (mm)			Weight (g)		
					Range	Average		Range	Average	
Bear Valley Creek	27 Jul - 29 Jul	1,558	1,460	1,455	49 - 82	63.1		1.6 - 7.7	3.5	
Elk Creek	29 Jul - 01 Aug	1,542	1,514	1,512	51 - 85	66.7		2.3 - 8.2	4.1	
Sulphur Creek	31 Jul - 01 Aug	769	728	728	52 - 85	62.0		1.4 - 6.7	3.0	
Marsh Creek	02 Aug	1,680	1,590	1,575	49 - 118	69.0		1.3 - 8.5	4.0	
Cape Horn Creek	03 Aug	3,833	1,445	1,443	47 - 100	61.7		1.4 - 5.0	2.7	
Valley Creek	04 Aug - 05 Aug	1,944	1,552	1,552	51 - 109	64.2		2.2 - 6.6	3.7	
Camas Creek	08 Aug - 10 Aug	1,986	1,534	1,528	49 - 86	61.5		1.6 - 7.1	3.2	
Loon Creek	09 Aug	1,023	964	964	50 - 84	64.6		1.7 - 6.7	3.5	
Herd Creek	12 Aug - 13 Aug	568	534	534	53 - 99	73.7		3.9 - 3.9	3.9	
E. F. Salmon River	12 Aug - 13 Aug	1,070	986	986	50 - 96	73.8		1.8 - 11.8	5.4	
Big Creek (upper)	17 Aug	862	757	757	45 - 82	62.1		1.7 - 6.7	3.4	
S. F. Salmon River	16 Aug - 18 Aug	4,017	1,574	1,571	40 - 94	59.0		1.3 - 8.5	2.6	
Big Creek (lower)	21 Aug	757	727	727	53 - 91	75.2		2.8 - 7.4	5.3	
Rush Creek	21 Aug	15	15	15	69 - 93	74.9		- - - - -	---	
W F. Chamberlain Creek	21 Aug	928	917	917	52 - 97	66.2		1.6 - 11.0	3.3	
Chamberlain Creek	22 Aug	266	241	241	53 - 79	64.9		- - - - -	---	
Secesh River	23 Aug - 24 Aug	1,593	1,551	1,551	49 - 97	62.9		1.2 - 12.0	3.2	
Lake Creek	24 Aug	463	406	405	51 - 99	62.9		- - - - -	---	
Totals or averages	27 Jul - 24 Aug	24,074	18,495	18,462	45 - 118	65.0		1.2 - 12.0	3.6	

Appendix Table 2. A summary of observed collection mortality for PIT-tagged wild chinook salmon parr collected from streams in Idaho during July and August 1993.

Stream	Collection method	Number collected	Number tagged	Number rejected	Percent rejected (%)	<u>Observed collection mortality</u>	
						Mortality	(%)
Bear Valley Creek	seine & shock	1,558	1,450	71	4.6	24	1.7
Elk Creek	seine & shock	1,542	1,514	2	0.13	26	1.7
Sulphur Creek	seine & shock	769	728	38	4.9	3	0.4
Marsh Creek	seine & shock	1,680	1,590	96	5.1	4	0.2
Cape Horn Creek	seine & shock	3,933	1,445	2,383	(62.2)	5	0.1
Valley Creek	seine & shock	1,444	1,552	357	23.0	5	0.3
Camas Creek	seine & shock	1,986	1,534	399	23.1	53	2.7
Loon Creek	shock	1,023	964	37	3.6	22	(2.2)
Herd Creek	shock	568	534	7	2	27	4.8
E. F. Salmon River	shock	1,070	986	5	5	79	7.4
Big Creek (upper)	seine & shock	962	757	33	10.8	12	1.4
S. F. Salmon River	seine & shock	4,017	1,574	2,417	60.2	25	0.7
Big Creek (lower)	shock	757	727	1	0.1	29	(3.8)
Rush Creek	shock	15	15	0	-----	0	-----
W. F. Chamberlain Creek	seine	428	417	11	1.2	0	-----
Chamberlain Creek	shock	266	241	24	9.0	1	0.4
Secesh River	shock	1,593	1,551	33	2.1	9	(0.5)
Lake Creek	shock	463	406	56	12.1	1	(0.2)
Totals		24,874	19,495	6,050	24.3	323	1.3

Appendix Table 3. A summary of observed post-tagging mortality and tag loss for PIT-tagged wild chinook salmon parr collected from streams in Idaho during July and August 1994.

Stream	Number tagged	Observed post-tagging mortality					24 hour tag loss		Number released
		1/2 - 3 hours		24 hours		number	(%)		
		Mortality (%)	Number held	Mortality (%)					
Bear Valley Creek	1,460	3	(0.2)	448	2	(0.5)	0	(0.0)	1,455
Elk Creek	1,514	2	(0.1)	389	0	(0.0)	0	(0.0)	1,512
Sulphur Creek	728	0	(0.0)	75	0	(0.0)	0	(0.0)	728
Marsh Creek	1,590	15	(0.9)	128	0	(0.0)	0	(0.0)	1,575
Capehorn Creek	1,445	0	(0.0)	176	1	(0.61)	0	(0.0)	1,443
Valley Creek	1,552	0	(0.0)	111	0	(0.0)	0	(0.0)	1,552
Camas Creek	1,534	0	(0.0)	812	6	(0.7)	0	(0.0)	1,528
Loon Creek	964	0	(0.0)	0		(---)	--	(--)	964
Herd Creek	534	0	(0.0)	0		(---)	--	(---)	534
E. F. Salmon River	986	0	(0.0)	0		(---)	--	(---)	986
Big Creek (upper)	757	0	(0.0)	0		(---)	--	(---)	757
s. F. Salmon River	1,574	1	(0.1)	369	3	(0.8)	0	(0.0)	1,571
Big Creek (lower)	727	0	(0.0)	0	--	(---)	--	(---)	727
Rush Creek	15	0	(0.0)	0	--	(---)	--	(---)	15
ii. F. Chamberlain Creek	917	0	(0.0)	0	--	(---)	--	(---)	917
Chamberlain Creek	241	0	(0.0)	0		(---)	--	(---)	241
Secesh River	1,551	0	(0.0)	0	--	(---)	--	(---)	1,551
Lake Creek	406	1	(0.3)	0		(---)	--	(---)	405
Total	18,495	22	(0.1)	2508	12	(0.5)	0	(0.0)	18,462

Appendix Table 4A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Bear Valley Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Bear Valley Creek

Release date: 27 - 29 July 1994

Release site: Bear Valley Creek

Number released: 1,455

Release river kilometer(s) above Lower Granite Dam: 628 - 633

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
13 Apr	1					
16 Apr	1					
18 Apr	1					
19 Apr	1					
20 Apr	1					
21 Apr	1					
24 Apr				1		
25 Apr	1					
27 Apr	1					
28 Apr	2					
30 Apr	1					
01 May	2					
02 May	1					
03 May	2					
04 May	1					

Appendix Table 4A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
05 May	1	1			1	
06 May		1				
07 May	1			1		
08 May						
09 May	4 (5)					
10 May	2					
11 May	2 (3)					
12 May	1					1
13 May	2	1 (2)			1	1
14 May	2 (3)			2		
15 May	3 (4)					
16 May					2	
18 May	2 (3)					
19 May						
20 May	2 (3)					
21 May	2 (3)			1		
22 May						1
23 May				1	1	
24 May	2 (3)					

Appendix Table 4A. Continued.

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
25 May	1		1		1		
26 May	1			3			1
27 May	3		2				
28 May	1						
29 May	4			1			
30 May							
31 May	2						
01 Jun							
02 Jun	1						
03 Jun	2						
04 Jun	1						
05 Jun	1		2	3			
06 Jun	1						
07 Jun	1						
08 Jun	1			2			
09 Jun				1	1		
10 Jun	1	2		1			
11 Jun				1	1	1	
12 Jun	1			1			

Appendix Table 4A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
13 Jun			1			
14 Jun		1				2
15 Jun						1
16 Jun			1			
17 Jun						1
18 Jun				1		1
20 Jun	1					
24 Jun	1					
27 Jun	1					
28 Jun		1				
30 Jun	1					
01 Jul		1				
02 Jul						
03 Jul						
05 Jul						1
06 Jul	1					
08 Jul	1					
09 Jul						
11 Jul					1	

Appendix Table 4.4. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
13 Jul	1					
14 Jul			1			
17 Jul			2			1
19 Jul			1			
20 Jul	1					
21 Jul						1
05 Aug						1
06 Aug				1		
.27 Aug				1		
Totals	73 (82)	18 (20)	28	14	21	17

Appendix Table 4B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Bear Valley Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	previous detections				First detection	previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
29 Apr		1													
02 May	1 (2)														
03 May			1												
06 May		1													
10 May			1												
11 May		1													
13 May			1												
15 May				1											
17 May		1	2												
20 May		1													
25 May		1													
31 May			1												
05 Jun			1												
36 Jun		1	1												
13 Jun			1												
14 Jun	1														
19 Jun		1		1											
21 Jun															
06 Jul		1													
39 Jui				1											
16 Jul															
18 Jul															

Appendix Table 4B. Continued.

Detection. date	McNary				John Day					Bonneville				
	First detector.	Previous detections			First detection	Previous detections				First detection	Previous detections			
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams
06 Sep		1												
Totals	2 (3)	10	13	3				1						

Appendix Table 5A Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Elk Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Elk Creek

Release date: 29 July - 01 Aug 1994

Release site: Elk Creek

Number released: 1,5 12

Release river kilometer(s) above Lower Granite Dam: 634 - 637

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
10 Apr	1					
11 Apr	1					
12 Apr	1					
13 Apr	1					
15 Apr	1					
17 Apr	2					
18 Apr	2					
20 Apr	1					
21 Apr	3				1	
22 Apr				1		
23 Apr	1					
26 Apr	2				1	
27 Apr	1					
28 Apr	3					
29 Apr	3				1	

Appendix Table 5A. Continued.

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
30 Apr	1						
01 May	1			1	1		
02 May			1				
03 May	2		1	1	1		
04 May	1						
05 May	1			1	1		
06 May			1	1	1		
07 May	1						1
08 May			1		2	3	
09 May	6	7	1				
10 May	2		1		1		
11 May	1		2	3			
12 May					1		1
13 May	2		1	2			1
14 May	5	6					1
16 May					1		
17 May			1		1		
18 May			1				
19 May	2	3					

Appendix Table 5A. Continued.

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
20 May	2	3		2	1		
21 May	1						
22 May					1	2	1
24 May	2	3					
25 May	1						
27 May	3		1				
28 May	1		2				
29 May			2				
31 May	1						
01 Jun	2						
03 Jun	3						
04 Jun	2						
05 Jun	1						1
06 Jun							1
07 Jun	1		1	2	1		
08 Jun							
09 Jun							
10 Jun				2			
11 Jun	1			3			

Appendix Table 5A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
12 Jun	1					
13 Jun					1	
14 Jun		1				1
15 Jun		1				
16 Jun		1			1	
19 Jun	2				2	
22 Jun						
25 Jun						
26 Jun	1					
28 Jun						
29 Jun		1				
01 Jul						
04 Jul						
05 Jul	1	1				
06 Jul					1	
09 Jul	1					
14 Jul					1	

Appendix Table 5A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
24 Jul					1	
Totals	75 (80)	28 (31)	18	16 (17)	23	8

Appendix Table 5B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Elk Creek, 1995.
Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First: detect-on	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
23 Apr		1													
01 May		1	1												
03 May		1													
04 May		1													
36 May		1													
37 May		1													
ay		1	1												
11 May		1													
12 May		1													
13 May	1 (2)														
14 May		1													
15 May	- (2)														
15 May			1												
18 May	1, 2														
20 May															
21 May			1												
32 Jun			1												
33 Jun			1												
34 Jun		1													
06 Jun		1													
13 Jun															
18 Jun				1											

Appendix Table 5B. Continued.

Detection date	McNary				John Dav				Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections			
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams
27 Jul			1											
Tctals	3 (6)	12	8	3			1	1						

Appendix Table 6A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Sulphur Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Sulphur Creek

Release date: 31 July - 01 Aug 1994

Release site: Sulphur Creek

Number released: 728

Release river kilometer(s) above Lower Granite Dam: 604 - 606

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
11 Apr	2						
14 Apr	1						
16 Apr				1			
18 Apr	1						
19 Apr							
21 Apr							
25 Apr	1						
26 Apr							
28 Apr	1						
02 May	1						
03 May						1	
04 May							
05 May						1	
06 May	2	3					
07 May							

Appendix Table 6A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
08 May	1	2	(3)		1	
09 May	5 (6)			2 (3)		
10 May	2	1			1	
11 May		5 (7)				
12 May	1					
13 May		2 (3)		1	4	
14 May	1	1 (2)				
15 May	1			1		
16 May	1	2 (3)			1	
1 May	1	1		4 (5)	1	
1 May	1					
19 May					1	
20 May			1	1		
21 May	1					
22 May	2 (3)			1		
23 May	2 (3)			2 (3)		
24 May	1	2 (3)				
25 May	2		2	1	1	
26 May	1	2	1		1	

Appendix Table 6A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
27 May	1	1	2		1	
28 May	5		1		1	1
29 May	2	1			1	1
30 May			2			
31 May					1	
01 Jun	2		1			2
03 Jun	1	1				
04 Jun	1	1	1		1	
05 Jun	2			1	1	
06 Jun	3 (4)					
07 Jun			2			
08 Jun			2			
09 Jun	1				1	
10 Jun					1	2
11 Jun			1			
12 Jun			1		3	
13 Jun				1		
14 Jun	1					
15 Jun	1					

Appendix Table 6A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
17 Jun					2	
21 Jun	1	1				
23 Jun	1		1			
30 Jun			1			
01 Jul	1		1			
02 Jul	1					
03 Jul						1
05 Jul			1			
07 Jul						1
09 Jul			1			
14 Jul						1
Totals	56 (61)	34 (41)	27	18 (21)	26	12

Appendix Table 6B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Sulphur Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
01 may	1														
07 may			1												
08 may		1													
12 May		2	1												
15 may		1													
15 May			2												
17 may		1	2												
22 Hay		1													
01 Jun			1												
02 Jun				1											
03 jun			2												
04 Jun				1											
05 Jun			1												
06 Jun	1 (2)														
07 Jun			1												
12 Jun				1											
13 Jun			2												
15 Jun															
17 Jun	1 (2)														
18 Jun				1											
22 Jun		1													
38 Jun				1											

Appendix Table 6B. Continued.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
18 Jul				1											
Totals	3 (5)	7	13	6		1		1							

Appendix Table 7A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Marsh Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Marsh Creek

Release date: 02 - 03 Aug 1994

Release site: Marsh Creek

Number released: 1,575

Release river kilometer(s) above Lower Granite Dam: 630 - 633

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
11 Apr	2					
12 Apr	4					
13 Apr	2					
14 Apr	2					
15 Apr						
16 Apr	1					
17 Apr	1					
18 Apr	2					
19 Apr	1					3
20 Apr	3					
21 Apr	1					
22 Apr		1	2)			
24 Apr	2					1
26 Apr	1					
27 Apr	1					

Appendix Table 7A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
28 Apr	5	1			1	
29 Apr	2	1		1	1	
30 Apr	2					
01 May	5		2			
02 May	4	1				
03 May	3		1			
04 May	2 (3)	1	2		2	
05 May	2 (3)	1		2		
06 May	1	3 (4)	1	2 (3)	2	2
07 May	1		1		3	
08 May		2 (3)	1		4	1
09 May	6 (7)	3 (4)				1
10 May	4 (5)				1	
11 May	5 (6)	4 (6)	4		2	
12 May	4 (5)	1		1	1	1
13 May	3 (4)	1 (2)	1	2 (3)	3	
14 May	4 (5)	1 (2)	2	2	1	
15 May	6 (8)	1			1	
16 May			1	1	1	

Appendix Table 7A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
17 May		1	2	1		
18 May	2 (3)	3 (4)	3		4	
19 May	1	1		1		1
20 May	2 (3)	2 (3)	1	1	1	1
21 May	2 (3)			1	1	
22 May	1				3	
23 May	1	2 (3)				
24 May	1	1				
25 May	2	1				
26 May				1		
27 May	3					
28 May		1		1		2
29 May						2
01 Jun	3	1				
02 Jun						
03 Jun						1
05 Jun						1
07 Jun						
08 Jun						1

Appendix Table 7A. Continued.

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>			
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams	
09 Jun					1			
11 Jun				1	1		1	
14 Jun							1	
19 Jun	1							
23 Jun				1				
28 Jun					1			
08 Jul	1							
20 Jul				1				
Totals	103	(116)	35	(46)	46	21 (23)	34	20

Appendix Table 7B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Marsh Creek. 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
26 Apr				1											
29 Apr															
31 May															
32 May		1													
03 May	1 (2)		1												
04 May															
09 May															
10 May		2													
11 May			2												
12 May	1 ! 2;		1												
13 May		1	1	2											
14 May		2													
15 May	1 21		1												
16 May			1	1											
13 May	1 2:		1												
13 May		1	2												
21 May		1													
22 May															
23 May	1 ! 2														
25 May		1													
25 May			2												
28 May	1 : 2														

Appendix Table 7B. Continued.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
01 Jun	2 (3)														
02 Jun	1 (2)														
05 Jun			1												
13 Jun		1													
Totals	9 (17)	12	15	4			2	2							

Appendix Table 8A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Cape Horn Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Cape Horn Creek

Release date: 03 Aug - 04 Aug 1994

Release site: Cape Horn Creek

Number released: 1,443

Release river kilometer(s) above Lower Granite Dam: 635

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
14 Apr	1					
15 Apr	2					
18 Apr	1	1				
22 Apr			1			
23 Apr			1			
24 Apr	2					
26 Apr	1					
27 Apr	1					
28 Apr	1		1			
29 Apr	1					
30 Apr						
01 May	2		1			
02 May	1					
03 May	1		1			
04 May	3 (4)					

Appendix Table 8A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
05 May	1	1		2		
06 May	1	1		2 (3)		1
07 May	1	2 (3)	3			
08 May	1	2 (3)	2		2	1
09 May	6 (7)		1			1
10 May	4 (5)					1
11 May	5 (6)		3			
12 May	3 (4)	2 (3)	1			2
13 May	1	1 (2)	1			
14 May	2 (3)	1 (2)	2	3 (4)	1	1
15 May	3 (4)	1			4	
16 May	2 (3)				1	
17 May		2 (3)	1	1	1	
18 May	1					
19 May				1	1	
20 May	2 (3)	1				
21 May	2 (3)	1				
22 May					2	
23 May	1	3 (4)			1	

Appendix Table 8A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
24 May	1	1	1		1	
25 May	1	3 (4)	1		2	
26 May					1	
27 May	2		3			
28 May	3				1	
29 May	1					
30 May					1	
31 May	1				1	
01 Jun	1					
02 Jun	2				1	
03 Jun					3	
04 Jun						
05 Jun	3		1			
06 Jun	1	1			1	
07 Jun	3 (4)		1			
08 Jun		1			1	
10 Jun		1	1			1
11 Jun		1				
12 Jun	1	1	1			1

Appendix Table 8A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
13 Jun	1					
14 Jun					1	1
16 Jun					1	
19 Jun	2					
23 Jun	1	1				1
24 Jun		1				
28 Jun					2	
30 Jun	1	1			1	
02 Jul				1		
03 Jul	1				1	
05 Jul	1					
07 Jul	1					
08 Jul			1			
09 Jul		1		1		
10 Jul			2			
13 Jul						
16 Jul						2
17 Jul			1			
18 Jul			1			

Appendix Table 8A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
22 Jul	1					
24 Jul						1
25 Jul			1			
28 Jul	1					
02 Aug			1			
05 Aug						
06 Aug						
10 Aug		1				
21 Aug		1			1	
17 Sep					1	
Totals	84 (95)	39 (47)	37	19 (21)	34	22

Appendix Table 8B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Cape Horn Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day				Bonneville						
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
30 Apr		2													
05 May		1													
08 May		1													
10 May		2													
11 May	1 (2)														
12 May	1 (2)			1											
13 May		1													
14 May				1											
15 May															
16 May	1 (2)														
17 May			2												
18 May				1											
23 May	1 (2)	2	1												
22 May				1											
23 May		1	1												
26 May		1	1												
31 May			1												
01 Jun			1	1											
02 Jun			1												
03 Jun		1													
34 Jun	1 (21)														
10 Jun		1													

Appendix Table 8B. Continued.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
11 Jun		1													
14 Jun															
15 Jun	1 (21														
16 Jun			1												
18 Jun			1												
20 Jun			1												
C2 Jul			1												
04 Jul			1												
14 Jul		1													
25 Jul			1												
31 Jul				1											
Totals	6 (12)	15	14	5		2									

Appendix Table 9A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Valley Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Valley Creek

Release date: 04 - 05 Aug 1994

Release site: Valley Creek

Number released: 1,552

Release river kilometer(s) above Lower Granite Dam: 743 - 757

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
22 Apr	2					
28 Apr	1					
30 Apr						
01 May			1			
02 May	1					
03 May	1					
04 May	1					
05 May						
06 May	1		1			
07 May		1	1			
09 May	1					
10 May				1		
11 May	2 (3)				1	
12 May				1		
13 May				1		

Appendix Table 9A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
14 May	1					
15 May					1	
16 May	1					
17 May						
18 May						
19 May	2 (3)				2	
21 May						
22 May						
23 May					1	
24 May						
25 May						
26 May			1		1	
27 May	2		1		1	
28 May	1					
29 May	2					
31 May	2					
01 Jun	1				1	
02 Jun	2		2			
03 Jun			1			

Appendix Table 9A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
04 Jun	1	1				
06 Jun	1	1			1	
07 Jun	2		2			
08 Jun	2	1				
09 Jun	3	1	2	2		1
10 Jun		1				
11 Jun	1	1				
12 Jun		1	3			1
13 Jun				1		1
14 Jun		2	1			
15 Jun	1				1	
16 Jun				1	1	
17 Jun					1	
18 Jun	1					
19 Jun	1					1
22 Jun	3					
23 Jun	3	1			1	
24 Jun						
28 Jun		1	1		1	

Appendix Table 9A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
29 Jun		1				
30 Jun			1		1	1
		1				
02 Jul					1	
03 Jul					1	
05 Jul					1	
06 Jul					1	
08 Jul	2					
09 Jul	1					1
10 Jul						
11 Jul	2					
13 Jul						
15 Jul	1					
18 Jul	1		1			
20 Jul			1			
24 Jul			1			
28 Jul			1			1
29 Jul						1
04 Aug						1

Appendix Table 9A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
07 Sep		1				
Totals	50 (52)	24	23	19	21	10

Appendix Table 9B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Valley Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detection	1 dam	2 dams	3 dams	4 dams	5 dams	6 dams	7 dams	8 dams	9 dams	10 dams	11 dams	12 dams	13 dams
06 May			1												
07 May			1												
08 May				2											
15 May	1 (2)														
17 May			1												
22 May			1												
25 May			1												
27 May			1												
31 May			1												
22 Jun				1											
23 Jun			1												
12 Jun															
17 Jun			1												
19 Jun				1											
20 Jun						1									
22 Jun				1											
32 Jul				1											
03 Jul						1									
36 Jul			1	1											
07 Jul															
06 Jul			1												
12 Jul				1											

Appendix Table 9B. Continued.

Detection or date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
13 Jul				1											
23 Jul	1														
Totals	2 (3)	11	9	3											

Appendix Table 10A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Camas Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Camas Creek

Release date: 09 - 10 Aug 1994

Release site: Camas Creek

Number released: 1,528

Release river kilometer(s) above Lower Granite Dam: 526 - 529

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
17 Apr	1					
20 Apr	1					
21 Apr	1					
25 Apr			1			
26 Apr	2			1		
27 Apr	2					
29 Apr				1		
30 Apr	2					
01 May					1	
0 May	2	1	1		1	
03 May	3		1		2	
04 May	1	1		1	1	
06 May		2 (3)			1	
07 May	1			2 (3)	1	
08 May	1	1			1	

Appendix Table 1 OA. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
09 May	5 (6)	2 (3)	1			
10 May	2				1	
11 May	5 (6)	1	2		1	
12 May	3 (4)	2 (3)		1		
13 May	1		1	1	2	
14 May	3 (4)	2 (3)		2		
15 May		1				
16 May		2 (3)		1		
17 May		2 (3)		3 (4)	4	
18 May					2	
19 May	1	2 (3)	1	1	1	
20 May	1			1		
21 May				1		
22 May						
23 May	2 (3)			1		
24 May	3 (4)				1	
25 May	2	1				1
26 May					1	
27 May	2	2				

Appendix Table 1 OA. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
28 May	1		1	1	1	
29 May	3		1			
30 May	1		1		1	
31 May		1		2		
01 Jun		1	1			
02 Jun						1
03 Jun	1	1	1			
04 Jun					1	
05 Jun	1		1	1	1	
06 Jun	3 (4)		1			
07 Jun		1 (2)				
08 Jun		2	3			
09 Jun				1	1	
10 Jun			1		1	1
11 Jun	2	2	1		1	
12 Jun						1
14 Jun					1	
15 Jun			1			1
16 Jun		1				

Appendix Table 1 OA. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
17 Jun					1	
18 Jun						1
21 Jun			1			
29 Jun						1
Totals	59 (66)	32 (40)	23	25 (27)	31	9

Appendix Table 10B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Camas Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day				Bonneville					
	First detection	Previous detections			First detection	Previous detections			First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams		4 dams	1 dam	2 dams	3 dams	4 dams
03 May														
35 May	2	1												
08 may			-											
11 may		2												
13 may														
15 May	1 (2)													
16 may		-												
17 may			1											
18 may	1 : 2:		1	1										
19 may														
21 may														
22 may	2													
23 Kay	2	4												
30 may														
31 May		1												
31 Jun.				-										
02 jun			-											
05 Jun														
CR Jun														
Totals	1 (12)	10	7	2		1								

Appendix Table 1 IA. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Loon Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Loon Creek

Release date: 09 Aug 1994

Release site: Loon Creek

Number released: 964

Release river kilometer(s) above Lower Granite Dam: 555 - 557

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
13 Apr	2					
16 Apr	1					
17 Apr			1			
18 Apr	1					
19 Apr	2					
20 Apr	2					
21 Apr						
22 Apr	1					
23 Apr	1					
24 Apr				1		
27 Apr	3					
28 Apr	3					
29 Apr	4					
01 May	1					
02 May	1					

Appendix Table I 1A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
03 May	3	2 (3)	1	1		
04 May	3 (4)	2 (3)	1	1		1
05 May		1	1	1	1	
06 May				1	2	
07 May		4 (6)	1		2	
08 May	1	2 (3)			1	
09 May	8 (10)				2	
10 May	4 (5)	1			3	
11 May	4 (5)	3 (4)		1		
12 May	4 (5)	1		2	1	
13 May	6 (7)	2 (3)	1	3 (4)	1	
14 May	3 (4)	2 (3)		1	3	
15 May		3 (4)	1	1	2	
16 May	2 (3)	2 (3)	2	2	1	
17 May	2 (3)	1	1		3	
18 May	2 (3)	1	1	3 (4)	4	
19 May		1	2			
20 May		2 (3)	3	1	1	
21 May			1	3 (4)		

Appendix Table I | A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
22 May			2		2	1
23 May	1				1	1
24 May	1	2 (3)			1	
25 May					1	
26 May	3 (4)	1				
27 May	2					
28 May	3	1			1	
29 May	2					
30 May		2				
31 May		1				
01 Jun	2				1	
02 Jun		1	2			
03 Jun	3	1	2			
04 Jun		1				
05 Jun	1				1	
06 Jun						
07 Jun	1		1		1	
08 Jun			1			
09 Jun					1	

Appendix Table 11A. Continued.

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
10 Jun				2			
11 Jun				2			1
12 Jun					2		
14 Jun							1
15 Jun						1	1
16 Jun							1
23 Sun							1
24 Jun					1		
Totals	83	(95)	40	(52) 36	30	(33) 38	16

Appendix Table I IB. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Loon Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	Firs: detection	McNary			First detection	John Day				First detection	Bonneville				
		Previous detections				Previous detections					Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
30 Apr			1												
07 May			1												
08 May				1											
09 May			1												
10 May			1												
12 May		1	2												
13 May			2												
15 May			1												
16 May		1													
17 MAY		1	1												
18 May			2												
19May		2	1												
20 May		1	1												
21 May	1 2														
22 May			1												
23 May	1 (2)	2	1												
24 May			1												
26 May		1		1											
27 May				1											
29 May			1												
31 Jun		1	2												
02 Jun			1												

Appendix Table 1 I B. Continued.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		dam	dams	dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
09 Jul		1													
19 Jun		1		1											
28 Jun		1													
Totals	24	13	21	4											

Appendix Table 12A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Herd Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Herd Creek

Release date: I2 - I3 Aug 1994

Release site: Herd Creek

Number released: 534

Release river kilometer(s) above Lower Granite Dam: 697 - 698

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
11 Apr	1					
16 Apr	1					
17 Apr	1					
18 Apr	2					
19 Apr	2				1	
21 Apr	2					
22 Apr		1 (2)				
24 Apr			1			
25 Apr	2					
27 Apr	2					
29 Apr						
30 Apr	2				1	
01 May	3					
02 May					1	
03 May	2					

Appendix Table 12A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection,	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
04 May	2 (3)	1			1	1
05 May		2 (3)				
07 May	2	1		1	1	
08 May				1	2	
09 May	4 (5)					
10 May	2			1	1	
11 May		i				
13 May	2	1 (2)		1	1	
14 May	1					
15 May		1	1		1	
16 May		2 (3)		1		
18 May			1		1	
20 May				2 (3)		
21 May		1	1			
23 May						1
27 May		1				
28 May		1				
03 Jun						
05 Jun						

Appendix Table 12A.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
08 Jun				1		
Totals	36 (38)	17 (21)	11	10 (11)	12	2

Appendix Table 12B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Herd Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection.	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dam	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
28 Apr	1														
30 Apr															
03 May	1 (2)														
08 May		1	1												
12 May			1												
13 May		1													
17 May		2													
19 May		1													
26 May						1									
Totals	2	3	2			1									

Appendix Table 13A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from the East Fork of the Salmon River. 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: E. F. Salmon River

Release date: 12 - 13 Aug 1994

Release site: E. F. Salmon River

Number released: 986

Release river kilometer(s) above Lower Granite Dam: 695 - 698

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
11 Apr	1					
13 Apr	6					
14 Apr	1					
15 Apr	3					
16 Apr	3					
17 Apr	4	1				
18 Apr	1					
19 Apr	1					
20 Apr	2					
21 Apr	5					
22 Apr	2					
23 Apr	1	1 (2)				
25 Apr		1 (2)	2			
26 Apr			1			
27 Apr						

Appendix Table 13A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
28 Apr	5	1			2	
29 Apr	3		1		1	
30 Apr		3 (4)			2	
01 May	2	1	2	1		
02 May	4	1	4	1		
03 May	4		3			
04 May	1		1		1	
05 May	1			1	1	
06 May		1	3			
07 May	1	2 (3)	2			
08 May	2 (3)	1	1		1	
09 May	3 (4)				1	
10 May	2	1	2			
11 May		1				
12 May					2	
13 May	1		1			
17 May	1					
20 May	1					
22 May						

Appendix Table 13A. Continued.

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
23 May	1						
25 May	1						
27 May	1						
28 May			1				
31 May				1		1	
01 Jun				1			
03 Jun							1
05 Jun						1	
Totals	69	(71)	16	(20)	26	6	15
						9	

Appendix Table 13B Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from the East Fork of the Salmon River, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
30 Apr	1														
02 May		1													
04 May		1													
05 May			1												
06 May			1												
07 May			2												
08 May	1 (2)	3	2												
09 May		1	2												
10 May		2													
13 May			1												
14 May	1 (2)														
16 May															
17 May	1 (2)		1												
24 May		1													
Totals	4 (7)	10	11	1											

Appendix Table 14A Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Big Creek (upper), 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Big Creek (upper)

Release date: 17 Aug 1994

Release site: Big Creek (upper)

Number released: 757

Release river kilometer(s) above Lower Granite Dam: 530 - 533

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
02 May	2					
04 May	1	1				
05 May	2 (3)		1	1		
06 May	1					
07 May	1					1
09 May	2	1	1	1		
10 May	2			1		
11 May	2 (3)	1			1	
12 May					1	
13 May	1				1	
14 May	2 (3)	1 (2)		1	1	
15 May	2 (3)	1	1	1		
16 May	1					
17 May	1	1			1	
18 May	1			2	2	

Appendix Table 14A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
19 May		2 (3)			1	
20 May	1					
21 May		1				
22 May			1			
23 May	2 (3)					
24 May	2 (3)		1	2 (3)	1	
25 May	1					
26 May	1	2				
27 May	2		1			
28 May		2	1		1	
29 May	3		2		2	
30 May	2	1			1	
31 May	1					
01 Jun	1					1
02 Jun	1					1
03 Jun		1	1			
04 Jun			1			
05 Jun			2			
06 Jun					1	

Appendix Table 14A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
07 Jun	2			1		
08 Jun	1	1		1		
09 Jun	2		1			
10 Jun		2		1	1	
11 Jun	1		1			
12 Jun		1		1	1	
13 Jun					1	
14 Jun						1
15 Jun						1
17 Jun		1				
19 Jun	1			1		
20 Jun	1					
21 Jun	1					
22 Jun	1		1			
24 Jun						1
26 Jun	1					
27 Jun			2			
29 Jun						
01 Jul						

Appendix Table 14A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
03 Jul			1			
07 Jul						1
11 Jul			1			
21 Jul		1				
27 Jul						1
28 Aug		1				
Totals	50 (56)	23 (25)	21	16 (17)	20	11

Appendix Table 14B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Big Creek (upper). 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	dims		1 dam	2 dams	3 dams	4 dams	5 dams
10 May															
13 May		1													
14 May			1												
16 May		1													
17 May			1												
19 May	1 (2)	1													
21 May	1 (2)														
25 May		1													
26 May	1 (2)														
27 May															
33 May						1									
31 Kay															
01 Jun			2												
02 Jun			1												
35 Jun	1 (2)														
22 Jun															
32 Jul															
05 Jul				1											
36 Jul			1												
31 Jul				1											
Totals	4 (8)	7	8	2		1	1								

Appendix Table 15A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from the South Fork of the Salmon River, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: S. F. Salmon River

Release date: 16 - 18 Aug 1994

Release site: S. F. Salmon River

Number released: 1,571

Release river kilometer(s) above Lower Granite Dam: 357 - 468

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
13 Apr	1					
14 Apr	2					
15 Apr	2					
16 Apr	1					
17 Apr		2				
18 Apr	1					
19 Apr	1					
20 Apr	1		1			
21 Apr	1		1			
22 Apr						1
24 Apr	1					
25 Apr						1
27 Apr	1					
28 Apr	1					
29 Apr	2					

Appendix Table 15A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
30 Apr	1					
01 May	3	1	1			
02 May	4		1			
03 May	4					
04 May	2 (3)					
05 May	2 (3)			2		
06 May	2 (3)	1	2	1		
07 May	1					
08 May	1		1	1		1
09 May	2		1			1
10 May	4 (5)		2			1
11 May	2 (3)	3 (4)	1	1		1
13 May	4 (5)				1	1
14 May	1	2 (3)	1	1		
15 May				2 (3)	1	
16 May	2 (3)					
17 May				1	1	1
18 May				1	1	
19 May		1			1	

Appendix Table 15A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
20 May	1	2 (3)	1	1		
21 May	1					
22 May				1	1	
23 May	1				3	
24 May	1	1				
25 May		1				
26 May						
27 May	2					
28 May	2					1
29 May	1					
30 May	2		1			
01 Jun	3					1
02 Jun		1		1		
03 Jun	1					
04 Jun	2					
05 Jun	1			1		
06 Jun	2			1		
07 Jun		1 (2)				
08 Jun						

Appendix Table I5A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
09 Jun	1				1	
10 Jun	2 (5)	1				
11 Jun	1	1			1	1
12 Jun				1		
13 Jun		1			1	
14 Jun				2	1	
17 Jun					1	
18 Jun					'	
19 Jun			1			
20 Jun			1		1	
22 Jun	1					
24 Jun		1				
25 Jun		1				
27 Jun					1	
28 Jun					1	
29 Jun						
02 Jul						
06 Jul	1					
08 Jul						

Appendix Table 15A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
10 Jul			2		1	
13 Jul	1					
22 Jul						
26 Jul					1	
Totals	78 (88)	23 (27)	23	19 (20)	30	12

Appendix Table 15B Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from the South Fork of the Salmon River, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
25 Apr		1													
30 Apr	1	1													
02 May	1 (2)	1													
04 May		1													
03 May			1												
09 May		1													
11 May		1	1												
12 May			1												
13 May	1 (2)		1												
14 May			1	1											
15 May				1											
17 May		1													
18 May		1													
13 May				1											
20 May		1													
23 May			1												
24 May															
26 May		1													
30 May	1 (21)														
31 Jun		1													
03 Jun	1 (2)														
04 Jun															

Appendix Table 1 5B. Continued.

Detection. date	McNary					John Day					Bonneville				
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				First detection
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
05 Jun															
06 Jun	1	2													
19 Jun															
13 Jul				1											
01 Aug				1											
Totals	6	11	13	8	4				1						

Appendix Table 16A Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Big Creek (lower). 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Big Creek (lower)

Release date: 21 Aug 1994

Release site: Big Creek (lower)

Number released: 727

Release river kilometer(s) above Lower Granite Dam: 488 - 491

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
11 Apr	1					
12 Apr	1					
13 Apr	2					
14 Apr	1					
15 Apr						
16 Apr	1					
17 Apr	5		1		1	
18 Apr	1					
19 Apr	1					
20 Apr	6				1	
21 Apr	5					
23 Apr	2	1 (2)				
24 Apr	1					
25 Apr	4					
26 Apr	9				1	

Appendix Table 16A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
27 Apr	4		1		1	
28 Apr	7	1			1	
29 Apr	4	1			1	
30 Apr	1	1	2	1	2	
01 May	7	2 (3)	1	2		
02 May	8	2 (3)	2	1		
03 May		1	2	1	2	
04 May	6 (8)		2	1		
05 May	3 (4)	2 (3)	4	1	2	
06 May	3 (4)	3 (4)	4	1	3	
07 May	6 (7)		3	2 (3)	3	
08 May	1	3 (4)	1	2 (3)	2	
09 May	5 (6)	1	3		1	
10 May	4 (5)	4 (6)	2	2 (3)	1	
11 May	1	7 (10)	2		1	
12 May	1		4			
13 May		1 (2)	1		7	
14 May	5 (6)		1			
15 May		2 (3)			1	

Appendix Table 16A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
16 May				1		1
17 May			1	3 (4)		
18 May	1				3	1
19 May	1		1			
20 May	2 (3)			1		
21 May					1	
22 May					2	1
23 May					2	
24 May	1		1			
25 May		2	1			
26 May						
27 May			1			
31 May						
02 Jun					1	
05 Jun	1					
10 Jun					1	
Totals	112 (121)	37 (50)	42	22 (26)	41	21

Appendix Table 16B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Big Creek (lower), 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	<u>Previous detections</u>			First detection	<u>Previous detections</u>				First detection	<u>Previous detections</u>				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
30 Apr	1	1													
01 May		1													
02 May															
03 May	1 : 2)														
04 May	1 : 2'	1	1												
05 May			1												
06 May		2													
07 May			1												
08 May															
09 May	1 : 2		1												
10 May				2											
11 May		3	1												
12 May		1		1											
14 May		2	2												
16 May	2 : 4'	1													
17 May	1 : 2:	1	1												
18 May															
19 May															
20 May		1													
21 May			2												
22 May		1													

Appendix Table 16B. Continued.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
23 May				1											
28 May				1											
Totals	7 (13)	20	10	8			1						1		

Appendix Table 17A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Rush Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Rush Creek

Release date: 21 Aug 1994

Release site: Rush Creek

Number released: 15

Release river kilometer(s) above Lower Granite Dam: 490

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower</u>	<u>Monumental</u>	
	First detection	First detection	Previous detections at 1 dam.	First detection	Previous detections at 1 dam	Previous detections at 2 dams
29 Apr	1					
05 May					1	
07 May						
09 May	1					
17 May					1	
Totals	2	1		1	2	

Appendix Table 17B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Rush Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	previous detections			First detection	previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
11 May		1													
16 Hay		1													
21 May			1												
Totals		2	1												

Appendix Table 18A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from the West Fork of Chamberlain Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: W. F. Chamberlain Creek

Release date: 21 Aug 1994

Release site: W. F. Chamberlain Creek

Number released: 917

Release river kilometer(s) above Lower Granite Dam: 437 - 438

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
12 Apr	2					
13 Apr	1					
14 Apr	2					
15 Apr	1	1				
16 Apr	2					
17 Apr			1			
19 Apr	2					
20 Apr					1	
22 Apr			1			1
23 Apr					1	
27 Apr	1					
29 Apr						
01 May	1					
02 May	2		1			
03 May	1					

Appendix Table 18A. Continued

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
04 May	3 (4)					
05 May				1		
06 May		3 (4)				
07 May		1				
08 May						
09 May	3 (4)					
10 May	4 (5)	1		2 (3)		
11 May	1					1
12 May						
13 May		2 (3)				
14 May	1					
15 May	2 (3)					1
16 May		2 (3)				1
17 May		1				
18 May					1	
19 May					1	
20 May	1					
21 May	1				1	
23 May						

Appendix Table 18A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
24 May	1					
26 May	1		1		1	
28 May	1					
29 May	1					
31 May		1				
01 Jun		1				
03 Jun		1			1	
04 Jun			1		1	
06 Jun	1					
08 Jun	2		1			
09 Jun		1				
10 Jun	1 (2)		1			
11 Jun						1
13 Jun						
17 Jun						1
18 Jun						
20 Jun	2	1				
23 Jun			3			
25 Jun			1			

Appendix Table 18A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
27 Jun				1		
28 Jun		1				1
29 Jun		1				
30 Jun					1	
01 Jul					1	
03 Jul	1					
04 Jul						1
22 Sep	1					
Totals	43 (48)	21 (24)	17	7 (8)	19	8

Appendix Table 18B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from the West Fork of Chamberlain Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
02 May			1												
05 May		2													
10 May															
11 May															
14 May															
18 May		2													
24 May		1													
10 Jun			1												
18 Jun		1													
27 Jun	1 (2)														
04 Jul			1												
15 Jul	1														
Totals	2 (3)	6	6												

Appendix Table 19A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Chamberlain Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Chamberlain Creek

Release date: 22 Aug 1994

Release site: Chamberlain Creek

Number released: 241

Release river kilometer(s) above Lower Granite Dam: 438

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
21 Apr	1					
29 Apr	1					
03 May	1					
06 May		2 (3)				
07 May	1	3 (4)				
08 May	3 (4)			1		
09 May	2					
11 May		1				
12 May	1					
13 May				1		1
14 May	1					
15 May		1		1		
18 May						
19 May						
21 May		1				

Appendix Table 19A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
25 May					1	
26 May				1		
03 Jun				1		
07 Jun		1 (2)				
09 Jun		1				
10 Jun		1				
14 Jun						
20 Jun						
22 Jun						
28 Jun						
30 Jun						
01 Jul						1
02 Jul						1
05 Jul	1					
Totals	14 (15)	11 (14)	6	5	8	3

Appendix Table 19B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Chamberlain Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
11 May		1													
12 May		1	2												
16 May			2												
20 May		1													
30 Jun		1													
16 Jun			1												
05 Jul				1											
Totals		4	5	1											

Appendix Table 20A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Secesh River, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Secesh River

Release date: 23 - 24 Aug 1994

Release site: Secesh River

Number released: 1.55 1

Release river kilometer(s) above Lower Granite Dam: 430 - 432

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
10 Apr	2					
12 Apr	2					
13 Apr	4	1				
14 Apr	2					
15 Apr	6					
16 Apr	3	1				
17 Apr	2	1				
18 Apr	3					
19 Apr	2	1				
20 Apr	1					
21 Apr	4					
22 Apr	3	1 (2)				
23 Apr	1	1 (2)				
24 Apr	2					
26 Apr	1	1		1		

Appendix Table 20A. Continued

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
27 Apr			1	1	1	
28 Apr	1	1			1	
29 Apr	2				2	
30 Apr	4	1	1		2	
01 May	5	3 (4)		3 (4)		
02 May	1		1			
03 May	3	1	1	1	1	
04 May		1		1		2
05 May	2 (3)	1	1		3	
06 May	5 (6)	3 (4)	3	1		
07 May			1		1	1
08 May			1	1	3	1
09 May	3 (4)		1	1		
10 May	5 (6)	1		1	1	
11 May	1	3 (4)	2			2
12 May	3 (4)	4 (5)		1	2	
13 May		1 (2)		3 (4)	1	1
14 May					3	
15 May		1		2 (3)		

Appendix Table 20A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
16 May			1		1	
17 May		1		2	1	
18 May			1	1		1
20 May				1	1	
21 May	1	1				
22 May		2 (3)		1		
24 May	3 (4)	1				
25 May	1			1		
27 May	1					
28 May	1	2				
29 May		1				
31 May				1		
01 Jun	1	1				1
03 Jun						
04 Jun		1				
06 Jun	1					
07 Jun	2			1		
08 Jun						1
09 Jun		1				

Appendix Table 20A. Continued.

Detection date	<u>Lower Granite</u>		<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection		First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
10 Jun				1			
11 Jun			1				
12 Jun							1
13 Jun							
14 Jun							
18 Jun							
21 Jun							
22 Jun			1		1		
24 Jun					1		
28 Jun							
10 Jul							
13 Jul			2				
15 Jul			1				
26 Jul						1	
27 Jul					1		
Totals	86	(92)	44	(52)	28	(31)	36
				28			11

Appendix Table 20B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from the Secesh River. 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 darns		1 dam	2 dams	3 dams	4 dams		1 darn	2 dans	3 dams	4 darns	5 dams
25 Apr															
27 Apr		1													
28 Apr	1	1													
30 Apr															
01 May	2 : 3	1													
02 May		3													
04 May		1													
07 May		1		1											
09 May				1											
10 May			2	1											
11 May	1 2:	1													
12 May			4	1											
13 May															
15 May															
16 y		3	1	1											
May		1	2												
18 MAY				1											
19 May							1								
21 May		1													
22 May															
23 May	1 2	1													
25 May			1												

Appendix Table 20B. Continued.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
33 May	1 : 2														
31 May		1													
31 Jun															
23 Jun	1 : 2	1													
12 Jun	1 : 2														
16 Jun															
24 Jun															
21 Jul		1													
33 Jun		1													
31 Jul		1													
33 Aug			1												
Totals	8 (14)	23	19	6	1		1								

Appendix Table 2 | A. Detections of PIT-tagged smolts by date at three Snake River dams for wild chinook salmon from Lake Creek. 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Tagging site: Lake Creek

Release site: Lake Creek

Release river kilometer(s) above Lower Granite Dam: 452

Release date: 24 Aug 1994

Number released: 405

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
14 Apr	1					
16 Apr	1					
17 Apr	2					
18 Apr	1					
21 Apr			1			
23 Apr	1					
25 Apr	1					
27 Apr	1		1			
28 Apr			1			
29 Apr		1				
01 May	1		1		1	
02 May	1					
03 May		1				
04 May	1					
05 May		1	1		1	

Appendix Table 2 I A. Continued.

Detection date	Lower Granite	Little Goose		Lower Monumental		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
07 May				1	1	1
08 May		1	1			
09 May						
10 May					1	1
11 May						
12 May						
16 May						
20 May				1		
23 May	2 (3					
24 May	1					
27 May	1					
30 May				1		
05 Jun	1					
07 Jun	1					
08 Jun						
10 Jun	1 (2)					
13 Jun						
29 Jun						
01 Jul						

Appendix Table 2 I A. Continued.

Detection date	<u>Lower Granite</u>	<u>Little Goose</u>		<u>Lower Monumental</u>		
	First detection	First detection	Previous detections at 1 dam	First detection	Previous detections at 1 dam	Previous detections at 2 dams
20 Jul	1					
09 Aug				1		
Totals	24 (26)	6	8	4	6	3

Appendix Table 2 I B. Detections of PIT-tagged smolts by date at three Columbia River dams for wild chinook salmon from Lake Creek, 1995. Numbers in parentheses are first detections at the dams that have been adjusted for spill.

Detection date	McNary				John Day					Bonneville					
	First detection	Previous detections			First detection	Previous detections				First detection	Previous detections				
		1 dam	2 dams	3 dams		1 dam	2 dams	3 dams	4 dams		1 dam	2 dams	3 dams	4 dams	5 dams
29 Apr			1												
30 Apr															
07 May	1 (2)														
13 May			1												
11 May															
24 May		1													
05 Jun		1													
14 Jun			1												
34 Jul			1												
14 Aug		1													
Totals	1 (2)	4	4	1											

Appendix Table 22. A summary of the tagging dates, start tagging times and temperatures (°C), release dates, times, and temperatures, methods of capture, distance (in kilometers) from the stream's mouth to the release point, number released, unadjusted number detected, and unadjusted percent detected for each tag group at six downstream dams during 1995.

Stream	Tag group	Tagging date	Tagging time	Release date	Release time	Tagging temp. (°C)	Release temp. (°C)	Capture method	Release River km	Number Released	Number detected	Percent detected (%)
Bear Valley Creek	SA94208.BV1	21 Jul	07:39	27 Jul	09:30	15.5	15.5	Shock	9	90	9	10.0
	SA94208.BV2	27 Jul	08:36	27 Jul	10:00	15.5	15.5	Shock	10	125	13	10.4
	SA94208.BW	27 Jul	09:57	28 Jul	06:00	16.0	16.0	Shock	11	18	9	11.5
	SA94209.BV1	28 Jul	06:31	28 Jul	08:30	15.5	15.5	Shock	11	70	4	5.1
	SA94209.BV2	28 Jul	07:27	28 Jul	10:00	15.5	16.0	Shock	12	211	15	7.1
	SA94209.BV3	28 Jul	08:25	29 Jul	06:30	16.0	15.5	Shock	12	153	10	6.5
	SA94209.BV4	28 Jul	09:44	29 Jul	06:30	16.0	15.5	Shock	13	215	12	5.6
	SA94210.BV1	29 Jul	06:51	29 Jul	08:00	15.5	15.5	Shock	13	119	8	6.7
	SA94210.BV2	29 Jul	07:36	29 Jul	09:30	15.5	15.5	Seine	14	132	9	6.8
	SA94210.BV3	29 Jul	08:32	29 Jul	09:30	15.5	15.5	Seine	14	150	13	6.7
	SA94210.BV4	29 Jul	09:20	29 Jul	10:30	15.5	16.5	Shock	14	112	5	4.5
Elk Creek	SA94210.EC1	29 Jul	09:39	30 Jul	—	—	—	Seine	1	159	17	10.7
	KMC94211.EC1	30 Jul	11:32	30 Jul	13:30	16.0	17.0	Shock	1	100	4	4.0
	KMC94211.EC2	30 Jul	12:21	31 Jul	06:00	16.5	14.0	Shock	1	67	10	14.9
	KMC94212.BC1	31 Jul	06:27	31 Jul	—	14.5	15.0	Shock	1		10	5.3
	KMC94212.BC2	31 Jul	08:21	31 Jul	12:00	14.0	17.5	Shock	2	111	12	10.3
	KMC94212.BC3	31 Jul	09:35	31 Jul	12:00	15.5	17.5	Shock	2	156	17	10.9
	KMC94212.BC4	31 Jul	11:13	01 Aug	06:30	17.0	—	Shock	2	162	12	7.4
	KMC94213.EC1	01 Aug	07:39	01 Aug	09:30	14.0	15.0	Shock	3	38	5	13.2
	KMC94213.BC2	01 Aug	08:01	01 Aug	10:30	14.5	15.5	Shock	3	398	27	6.9
	KMC94213.BC3	01 Aug	10:10	01 Aug	11:30	15.0	16.0	Shock	4	126	8	6.3

Appendix Table 22. Continued.

stream	Tag group	Tagging date	Tagging time	RelCFISE date	Release time	Tagging temp. (°C)	Release temp.(°C)	capture method	Release River km	Number Released	Number detected	Percent detected (%)
Sulphur Creek	SA94212.SU1	3 1 Jul	08:30	3 1 Jul	09:30	11.0	11.0	Seine	5	42	7	16.7
	SA94212.SU2	3 1 Jul	10:00	01 Aug	—	11.0	—	Shock	5	15	11	14.7
	SA94212.SU3	3 1 Jul	12:17	01 Aug	07:00	13.0	11.0	Shock	6	198	18	9.1
	SA94213.SU1	0 1 Aug	08:14	01 Aug	09:30	11.0	11.5	Shock	6	124	22	17.7
	SA94213.S42	0 1 Aug	10:00	01 Aug	12:00	11.5	13.5	Shock	—	101	18	17.8
	SA94213.SU3	01 Aug	11:29	01 Aug	13:30	12.5	14.5	Shock	7	188	35	18.6
Marsh Creek	SA94214.MC1	0 2 Aug	07:43	0 2 Aug	12:00	9.0	12.5	seine	14	383	39	10.2
	SA94214.MC2	02 Aug	09:37	0 3 A"g	—	9.5	—	Shock	11	128	14	10.9
	SA94214.MC3	02 Aug	10:58	02 Aug	12:30	11.5	13.0	Shock	32	178	19	10.7
	SA94214.MC4	0 2 Aug	11:39	0 2 Aug	13:30	12.5	15.5	Seine	14	406	45	11.1
	KMC94214.MC1	0 2 A"g	12:03	0 2 Aug	13:30	12.5	15.5	Seine	14	480	51	10.6
Cape Horn Creek	SA94215.CH1	0 3 Aug	07:36	0 3 Aug	11:00	9.5	12.5	Seine	6	295	27	9.2
	SA94215.CH2	0 3 Aug	09:32	0 4 A"g	06:30	10.0	9.5	Sd11.2	6	175	20	11.4
	SA94215.CH3	0 3 Aug	10:24	0 3 Aug	13:00	11.0	14.5	Seine	6	454	50	11.0
	SA94215.CH4	0 3 Aug	12:39	0 3 Aug	13:30	14.5	14.5	Shock	6	60	4	6.7
	KMC94215.C11	0 3 Aug	12:16	0 3 Aug	13:30	13.0	14.5	Seine	6	459	47	10.2
Valley Creek	SA94216.VC1	04 Aug	08:11	04 Aug	10:30	11.5	14.5	Shock	4	675	36	5.3
	SA94216.VC2	04 Aug	10:29	05 Aug	08:30	14.5	11.0	Shock	4	111	6	5.4
	SA94217.VC1	0 5 A"g	08:53	0 5 Aug	10:00	10.0	13.0	Shock	18	55	3	5.5
	SA94217.VC2	0 5 Aug	08:15	0 5 Aug	10:30	11.0	13.0	seine	—	711	50	7.0

Appendix Table 22. Continued.

stream	Tag group	Tagging date	Tagging time	Release date	Release time	Tagging temp. (°C)	Release temp. (°C)	capture method	Release River km	Number Released	Number detected	Percent detected (%)
camas Creek	SA94220.CA1	08 Aug	11:32	09 Aug	06:30	11.0	11.0	Seme	22	43	7	16.2
	SA94220.CA2	08 Aug	12:01	09 Aug	09:00	12.0	10.5	Shock	22	499	47	9.4
	SA94221.CA1	09 Aug	06:49	09 Aug	12:30	11.0	14.5	Shock	23	73	11	15.1
	SA94221.CA2	09 Aug	08:18	09 Aug	13:15	10.5	15.0	Shock	20	298	19	6.3
	SA94221.CA3	09 Aug	10:52	10 Aug	06:30	11.5	10.0	Shock	21	266	14	5.1
	SA94222.CA1	10 Aug	08:32	10 Aug	09:45	9.5	10.5	Shock	22	20	—	—
	SA94222.CA2	10 Aug	08:45	10 Aug	10:00	9.5	10.5	Shock	21	329	24	7.3
Loon Creek	DJK94221.LN1	09 Aug	08:50	09 Aug	12:45	9.5	12.0	Shock	33	303	40	13.2
	DJK94221.LN2	09 Aug	12:41	09 Aug	14:15	9.0	12.0	Shock	33	196	33	16.8
	DJK94221.LN3	09 Aug	13:21	09 Aug	14:15	9.0	12.0	Shock	34	148	28	18.9
	DJK94221.LN4	09 Aug	13:55	09 Aug	14:45	9.0	12.0	Shock	35	132	21	15.9
	DJX94221.W5	09 Aug	14:15	09 Aug	15:15	12.0	12.0	Shock	35	185	33	17.8
Herd Creek	SA94224.HC1	12 Aug	10:39	12 Aug	12:00	12.0	12.5	Shock	0	311	40	12.7
	SA94225.HC1	13 Aug	09:44	13 Aug	11:45	12.0	14.0	Shock	2	223	25	11.2
B. F. Salmon River	SA94224.BP1	12 Aug	09:01	12 Aug	11:00	11.5	12.5	Shock	13	270	20	7.4
	SA94224.BF2	12 Aug	11:58	12 Aug	13:00	14.0	14.0	Shock	14	173	22	12.7
	SA94225.BP1	13 Aug	08:41	13 Aug	11:30	11.0	14.0	Shock	15	253	23	9.1
	SA94225.BP2	13 Aug	11:46	13 Aug	12:00	13.0	14.5	Shock	16	290	30	10.3
Big Creek (upper)	MBB94229.BC1	17 Aug	07:42	17 Aug	—	8.0	14.0	Seine	52	358	38	10.6
	PAO94229.BC2	17 Aug	11:22	17 Aug	—	12.0	14.0	Shock	53	216	34	15.7
	MBB94229.BC3	17 Aug	13:13	17 Aug	—	—	—	Shock	55	183	21	11.5

Appendix Table 22. Continued.

Stream	Tag group	Tagging date	Tagging time	Release date	Release time	Tagging temp. (°C)	Release temp. (°C)	capture method	Release River km	Number Released	Number detected	Percent detected (%)
S. P. Salmon River	SA94228.SFI	16 Aug	07:57	16 Aug	11:30	12.0	14.0	Seine	112	367	24	6.5
	SA94228.SF2	16 Aug	10:52	16 Aug	12:30	13.0	14.5	Seine	113	328	20	6.1
	SA94229.SFI	17 Aug	10:12	18 Aug	-----	10.0	-----	seine	117	54	7	13.0
	SA94229.SF2	17 Aug	12:54	18 Aug	-----	13.5	-----	Shock	122	313	36	11.5
	SA94230.SPI	1 Aug	08:05	18 Aug	12:15	9.0	12.5	Shock	123	507	39	7.7
Big Creek (lower)	DJK94233.BC1	21 Aug	09:28	21 Aug	13:00	13.0	15.0	Shock	10	262	71	27.1
	DJK94233.BCZ	21 Aug	11:00	21 Aug	13:20	14.0	15.0	Shock	11	210	52	24.8
	DJK94233.BC3	21 Aug	11:47	21 Aug	-----	14.0	15.0	Shock	13	255	55	21.6
Rush Creek	DJK94233.RCI	21 Aug	13:30	21 Aug	14:00	15.0	15.0	Shock	1	15	4	26.7
w. P. Chamberlain Creek	SA94233.WCI	21 Aug	08:35	21 Aug	11:30	9.0	11.5	Seine	1	450	40	8.9
	SA94233.WC2	21 Aug	10:44	21 Aug	13:00	10.5	13.5	seine	2	467	33	7.1
Chamberlain Creek	SA94234.CBI	22 Aug	11:46	22 Aug	13:45	10.5	11.5	Shock	26	241	30	12.4
Secesh River	SA94235.SBI	23 Aug	09:46	23 Aug	13:45	7.0	15.0	Shock	26	405	56	13.8
	SA94235.SB2	23 Aug	11:29	23 Aug	14:45	10.0	15.0	Shock	27	810	75	9.3
	KMC94236.SBI	24 Aug	09:55	24 Aug	12:00	9.0	11.0	Shock	28	336	36	10.7
Lake Creek	KMC94236.LCI	24 Aug	12:11	24 Aug	15:00	11.0	13.5	Shock	3	405	35	8.6

Appendix Table 23. Daily detections of PIT-tagged wild spring/summer chinook salmon smolts from Idaho at Lower Granite Dam during 1995, with associated river flows (kcfs), spill (kcfs), and water temperatures (°C) at the dam. Adjusted numbers detected are calculated during spill.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case water temperature (°C)	Numbers detected	Adjusted numbers detected
07 Apr	46.9	0.0	9.4	0	0
08 Apr	60.1	0.0	10.0	0	0
09 Apr	71.1	0.0	10.0	0	0
10 Apr	64.2	0.0	10.0	3	3
11 Apr	68.2	0.0		8	8
12 Apr	65.1	0.0	10.0	10	10
13 Apr	61.2	0.0	10.0	20	20
14 Apr	73.4	0.0	10.0	13	13
15 Apr	70.3	0.0	8.9	15	15
16 Apr	69.8	0.0	8.9	15	15
17 Apr	52.0	1.8	----	18	19
18 Apr	64.5	0.0	9.4	17	17
19 Apr	64.2	0.0	----	13	13
20 Apr	64.4	0.0	9.4	18	18
21 Apr	63.6	0.0	9.4	24	24
22 Apr	59.3	0.0	9.4	8	8
23 Apr	52.5	0.0	9.4	7	7
24 Apr	53.7	0.0	9.4	8	8
25 Apr	60.1	0.0	9.4	9	9
26 Apr	67.2	0.0	9.4	18	18
27 Apr	72.5	0.0	10.6	21	21
28 Apr	73.9	0.0	10.6	30	30
29 Apr	79.4	0.0	----	23	23
30 Apr	84.1	0.0		14	14
01 May	81.1	0.0	10.6	33	33
02 May	88.4	0.0	10.6	33	33
03 May	93.1	9.9	10.0	30	34
04 May	94.7	20.7	10.0	28	36
05 May	96.9	21.7	10.6	15	19
06 May	98.9	21.8	10.6	16	21

Appendix Table 23. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case water temperature (°C)	Numbers detected	Adjusted numbers detected
07 May	118.1	23.5	10.6	17	21
08 May	128.8	27.4	10.0	11	14
09 May	114.8	22.0	10.0	67	83
10 May	115.0	21.9	10.6	45	56
11 May	118.2	24.9	10.6	32	41
12 May	119.6	21.8	10.6	22	27
13 May	112.4	21.7	11.7	23	29
14 May	101.9	21.8	11.1	32	41
15 May	95.6	21.9	11.1	17	22
16 May	101.4	21.9	11.7	9	11
17 May	106.2	21.7	11.7	5	6
18 May	109.4	22.2	12.2	10	13
19 May	112.7	24.3	12.8	7	9
20 May	114.7	27.4	12.8	15	20
21 May	116.1	27.4	13.3	11	14
22 May	118.5	27.3	13.3	3	4
23 May	120.5	27.3	13.3	13	17
24 May	117.5	27.4	13.3	20	26
25 May	116.5	19.9	13.3	13	16
26 May	111.9	19.8	13.3	7	9
27 May	108.3	6.3	13.3	26	28
28 May	109.0	6.4	13.3	21	22
29 May	102.0	6.4	13.3	19	20
30 May	110.9	6.5	13.9	5	5
31 May	122.6	6.8	15.0	7	7
01 Jun	133.0	10.9	15.0	16	17
02 Jun	133.6	10.0	15.0	6	6
03 Jun	133.8	11.3	15.0	11	12
04 Jun	141.2	13.4	15.0	7	8
05 Jun	144.0	17.4	15.0	13	15
06 Jun	149.1	25.4	15.0	13	16
07 Jun	145.8	23.5	15.0	14	17
08 Jun	130.6	11.8	13.3	6	7

Appendix Table 23. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature	water (°C)	Numbers detected	Adjusted numbers detected
09 Jun	122.3	7.6	12.2		7	7
10 Jun	115.1	65.6	12.8		5	12
11 Jun	105.7	13.0	12.8		6	7
12 Jun	111.4	7.0	14.4		3	3
13 Jun	117.9	6.5	15.0		1	1
14 Jun	120.0	7.4	15.6		1	1
15 Jun	118.9	9.1	15.6		2	2
16 Jun	121.6	13.6	15.6		0	0
17 Jun	115.9	13.1	15.6		0	0
18 Jun	117.3	13.3	15.6		1	1
19 Jun	118.4	17.3	14.4		7	a
20 Jun	118.7	23.2	14.2		5	6
21 Jun	110.0	21.3	13.9		3	4
22 Jun	100.3	14.2	-13.9		6	7
23 Jun	89.9	0.0	13.9		5	5
24 Jun	88.9	0.0	15.0		1	1
25 Jun	88.8	0.0	15.0		0	0
26 Jun	89.8	0.0	15.0		2	2
27 Jun	89.5	0.0	16.1		1	1
28 Jun	95.8	0.0	17.8		0	0
29 Jun	96.9	0.0	17.8		0	0
30 Jun	91.9	0.0	17.8		2	2
01 Jul	84.8	0.0	16.7		1	1
02 Jul	80.3	0.0	16.7		1	1
03 Jul	74.7	0.0	17.8		2	2
04 Jul	93.0	0.0	17.8		0	0
05 Jul	82.8	0.0	17.2		3	3
06 Jul	73.6	0.0	17.2		2	2
07 Jul	70.1	0.0	16.7		1	1
08 Jul	69.2	0.0	17.8		4	4
09 Jul	68.3	0.0	18.3		2	2
10 Jul	69.8	0.0	18.3		1	1
11 Jul	68.1	0.0	19.4		2	2

Appendix Table 23. Continued.

Date	Average flow (kcfs)	Avkrag spill (kcfs)	Scroll-case temperature (°C)	water	Numbers detected	Adjusted numbers detected
12 Jul	69.1	0.0	19.4		0	0
13 Jul	66.3	0.0	19.4		3	3
14 Jul	66.0	0.0	19.4		0	0
15 Jul	56.8	0.0	18.9		1	1
16 Jul	54.8	0.0	18.9		0	0
17 Jul	50.9	0.0	21.1		0	0
18 Jul	54.9	0.0	19.4		2	2
19 Jul	51.8	0.0	19.4		0	0
20 Jul	49.7	0.0	19.4		1	1
21 Jul	48.5	0.0	19.4		0	0
22 Jul	49.2	0.0	19.4		1	1
23 Jul	45.5	0.0	20.0		0	0
24 Jul	45.8	0.0	20.0		0	0
25 Jul	51.8	0.0	20.0		0	0
26 Jul	50.9	0.0	20.9		0	0
27 Jul	50.1	0.0	20.0		0	0
28 Jul	47.2	0.0	20.0		1	1
29 Jul	50.5	0.0	20.0		0	0
22 Sep	26.7	0.0	19.9		1	1

Appendix Table 24. Daily detections of PIT-tagged wild spring/summer chinook salmon smolts from Idaho at Little Goose Dam during 1995, with associated river flows (kcfs), spill (kcfs), and water temperatures (°C) at the dam. Numbers detected represent fish not detected- at a previous dam. Adjusted numbers detected are calculated during spill.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll,-case water temperature (°C)	Numbers detected	Adjusted numbers detected
10 Apr	64.0	0.0	6.1	0	0
11 Apr	74.9	0.0	----	0	0
12 Apr	61.4	0.0	6.7	0	0
13 Apr	63.6	0.0	7.2	1	1
14 Apr	74.7	2.0	7.2	0	0
15 Apr	80.1	6.4	10.0	2	2
16 Apr	76.2	8.0	7.8	1	1
17 Apr	49.0	2.8	----	6	6
18 Apr	63.9	12.2	8.9	1	1
19 Apr	61.7	14.4	9.4	1	1
20 Apr	73.9	17.7	9.4	0	0
21 Apr	68.1	20.2	9.4	0	0
22 Apr	62.6	21.0	9.4	3	5
23 Apr	51.2	20.2	9.4	3	5
24 Apr	53.3	21.2	10.0	0	0
25 Apr	63.5	21.8	10.0	1	2
26 Apr	65.7	21.7	10.0	2	3
27 Apr	72.4	20.4	10.0	0	0
28 Apr	74.3	19.5	10.0	4	5
29 Apr	81.6	19.1	----	4	5
30 Apr	85.4	19.3	----	8	10
01 May	81.0	19.3	10.6	8	11
02 May	83.6	20.1	10.6	8	11
03 May	91.8	21.1	10.6	8	10
04 May	97.9	22.7	10.6	9	12
05 May	97.7	23.9	10.6	10	13
06 May	96.9	24.3	10.0	22	29
07 May	115.9	33.1	10.6	16	22
08 May	126.7	39.2	11.1	15	22
09 May	113.5	35.0	11.1	8	12

Appendix Table 24. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case water temperature (°C)	Numbers detected	Adjusted numbers detected
10 May	111.7	32.9	11.1	10	14
11 May	117.5	33.4	10.6	32	45
12 May	96.0	24.7	10.6	10	13
13 May	111.8	40.1	10.6	13	20
14 May	101.0	36.5	11.1	10	16
15 May	93.5	30.6	12.2	12	18
16 May	100.6	25.2	11.7	10	13
17 May	102.0	24.6	11.7	12	16
18 May	106.0	26.4	11.7	5	7
19 May	110.1	24.4	11.7	7	9
20 May	113.4	29.3	12.2	9	12
21 May	112.4	28.4	13.3	6	8
22 May	117.2	38.5	13.3	4	6
23 May	123.4	35.2	13.3	6	8
24 May	115.1	29.4	13.3	9	12
25 May	116.9	22.7	13.3	9	11
26 May	109.2	5.8	13.3	6	6
27 May	106.9	2.9	13.3	9	9
28 May	107.2	3.3	14.4	10	10
29 May	99.5	1.9	15.0	6	6
30 May	112.8	11.6	15.0	3	3
31 May	118.1	14.3	15.0	4	5
01 Jun	130.5	27.4	15.0	5	6
02 Jun	133.2	31.6	15.6	2	3
03 Jun	134.4	31.6	15.6	5	7
04 Jun	139.4	35.8	15.6	4	5
05 Jun	144.5	43.7	15.6	2	3
06 Jun	147.0	45.9	15.6	2	3
07 Jun	145.8	49.3	15.6	4	6
08 Jun	131.5	25.9	12.8	7	9
09 Jun	122.9	17.6	12.8	5	6
10 Jun	115.8	10.6	12.2	10	11
11 Jun	106.4	5.7	12.8	10	11

Appendix Table 24. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature water (°C)	Numbers detected	Adjusted numbers detected
12 Jun	109.9	7.3	12.8	4	4
13 Jun	118.1	12.9	13.3	3	3
14 Jun	116.6	22.6	13.9	4	5
15 Jun	119.0	19.0	14.4	1	1
16 Jun	121.3	20.3	15.6	2	2
17 Jun	117.0	15.1	15.6	1	1
18 Jun	117.6	16.1	15.6	1	1
19 Jun	117.9	17.5	15.6	0	0
20 Jun	117.8	17.0	14.4	1	1
21 Jun	111.7	12.1	14.4	1	1
22 Jun	101.5	10.2	13.9	2	2
23 Jun	90.3	10.4	15.6	2	2
24 Jun	92.0	14.2	15.6	2	2
25 Jun	89.3	19.1	15.6	1	1
26 Jun	89.3	11.8	15.6	0	0
27 Jun	90.9	0.0	15.6	0	0
28 Jun	97.6	6.0	15.6	3	3
29 Jun	102.0	11.6	15.6	5	6
30 Jun	92.7	0.0	16.1	1	1
01 Jul	86.4	0.0	17.2	2	2
02 Jul	81.7	0.0	17.8	0	0
03 Jul	74.3	0.0	17.8	0	0
04 Jul	91.2	0.0	17.8	0	0
05 Jul	87.7	0.0	18.3	1	1
06 Jul	75.8	0.0	17.8	0	0
07 Jul	71.0	0.0	18.3	0	0
08 Jul	73.6	0.0	18.3	1	1
09 Jul	67.7	0.1)	17.8	2	2
10 Jul	74.6	0.0	17.8	0	0
11 Jul	72.3	0.0	18.9	0	0
12 Jul	73.9	0.0	19.4	0	0
13 Jul	71.6	0.0	18.9	3	3
14 Jul	67.6	0.0	19.4	0	0

Appendix Table 24. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature	water (°C)	Numbers detected	Adjusted numbers detected
15 Jul	57.0	0.0	20.0		1	1
16 Jul	56.5	0.0	21.7		0	0
17 Jul	51.4	0.0	21.1		0	0
18 Jul	56.4	0.0	22.2		0	0
19 Jul	52.7	0.0	21.1		0	0
20 Jul	50.4	0.0	20.6		0	0
21 Jul	49.1	0.0	20.6		1	1
22 Jul	48.8	0.0	21.1		1	1
23 Jul	46.6	0.0	21.1		0	0
24 Jul	46.5	0.0	21.1		0	0
25 Jul	49.8	0.0	21.1		0	0
26 Jul	51.2	0.0	----		0	0
27 Jul	50.2	0.0	21.1		0	0
28 Jul	48.4	0.0	21.1		0	0
29 Jul	51.5	0.0	21.1		0	0
30 Jul	46.1	0.0	21.1		0	0
31 Jul	46.3	0.0	21.1		0	0
01 Aug	46.5	0.0	21.1		0	0
02 Aug	45.9	0.0	21.1		0	0
03 Aug	45.1	0.0	21.1		0	0
04 Aug	44.7	0.0	21.1		0	0
05 Aug	45.1	0.0	20.6		0	0
06 Aug	41.5	0.0	20.6		0	0
07 Aug	44.9	0.0	20.6		0	0
08 Aug	42.8	0.0	20.0		0	0
09 Aug	41.3	0.0	21.1		0	0
10 Aug	42.3	0.0	20.0		1	1
11 Aug	34.1	0.0	19.4		0	0
12 Aug	35.5	0.0	20.5		0	0
13 Aug	33.3	0.0	20.0		0	0
14 Aug	34.3	0.0	20.0		0	0
15 Aug	35.2	0.0	20.0		0	0
16 Aug	34.4	0.0	19.4		0	0

Appendix Table 24. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	-Scroll-case water temperature (°C)	Numbers detected	Adjusted numbers detected
17 Aug	35.0	0.0	18.9	0	0
18 Aug	38.9	0.0	20.2	0	0
19 Aug	37.9	0.0	20.4	0	0
20 Aug	36.1	0.0	18.9	0	0
21 Aug	34.9	0.0	18.9	1	1
22 Aug	34.8	0.0	20.3	0	0
23 Aug	34.9	0.0	18.9	0	0
24 Aug	36.4	0.0	18.3	0	0
25 Aug	35.0	0.0	20.2	0	0
26 Aug	34.8	0.0	19.6	0	0
27 Aug	33.9	0.0	18.3	0	0
28 Aug	31.8	0.0	18.3	1	1
29 Aug	34.7	0.0	18.3	0	0
30 Aug	34.5	0.0	18.3	0	0
31 Aug	33.5	0.0	20.0	0	0
01 Sep	31.7	0.0	20.4	0	0
02 Sep	30.3	0.0	21.2	0	0
03 Sep	27.7	0.0	22.2	0	0
04 Sep	25.4	0.0	19.4	0	0
05 Sep	24.4	0.0	19.4	0	0
06 Sep	27.1	0.0	18.3	0	0
07 Sep	28.8	0.0	18.3	1	1
08 Sep	28.7	0.0	18.9	0	0
09 Sep	24.6	0.0	18.9	0	0

Appendix Table 25. Daily detections of PIT-tagged wild spring/summer chinook salmon smolts from Idaho at Lower Monumental Dam during 1995, with associated river flows (kcfs), spill (kcfs), and water temperatures ("C) at the dam. Numbers detected represent fish not detected at a previous dam. Adjusted numbers detected are calculated during spill.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature (°C)	water temperature (°C)	Numbers detected	Adjusted numbers detected
13 Apr	65.8	0.0	8.9		0	0
14 Apr	78.1	2.0	----		0	0
15 Apr	78.9	5.3	8.9		0	0
16 Apr	78.6	5.3	8.9		0	0
17 Apr	77.3	4.9	----		0	0
18 Apr	64.7	4.9	9.4		0	0
19 Apr	62.2	6.5	9.4		1	1
20 Apr	76.9	10.1	9.4		0	0
21 Apr	73.5	12.0	9.4		0	0
22 Apr	63.3	13.2	9.4		1	1
23 Apr	52.8	15.7	9.4		0	0
24 Apr	56.1	15.3	9.4		3	4
25 Apr	63.7	15.4	9.4		1	1
26 Apr	65.7	15.7	9.4		3	4
27 Apr	75.2	14.3	9.4		1	1
28 Apr	75.5	14.0	9.4		0	0
29 Apr	82.7	13.8	9.4		3	4
30 Apr	85.6	14.0	----		1	1
01 May	82.0	15.2	10.0		7	9
02 May	77.4	15.6	10.6		2	3
03 May	95.9	17.0	10.6		4	5
04 May	100.0	18.1	10.6		4	5
05 May	101.3	19.6	10.6		14	17
06 May	98.2	20.2	10.6		10	13
07 May	117.0	24.6	10.6		9	11
08 May	128.1	31.6	10.6		8	11
09 May	115.5	27.9	10.6		4	5
10 May	110.0	26.2	10.6		9	12
11 May	113.5	23.8	10.6		2	3
12 May	98.8	18.1	10.6		7	9

Appendix Table 25. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case water temperature (°C)	Numbers detected	Adjusted numbers detected
13 May	109.9	23.2	10.6	14	18
14 May	102.9	17.7	10.6	12	14
15 May	91.9	18.5	10.6	8	10
16 May	103.0	19.4	----	7	9
17 May	99.6	18.6	11.1	16	20
18 May	108.3	19.0	11.7	9	11
19 May	109.8	21.1	----	4	5
20 May	117.7	26.4	----	12	15
21 May	111.6	24.9	----	7	9
22 May	117.2	25.1	13.3	6	8
23 May	120.7	26.0	13.3	5	6
24 May	113.9	22.9	13.3	3	4
25 May	115.0'	17.4	13.3	6	7
26 May	111.1	4.5	13.9	4	4
27 May	109.3	2.0	13.9	1	1
28 May	108.3	2.5	14.4	3	3
29 May	98.7	15.8	14.4	1	1
30 May	117.1	11.2	14.4	2	2
31 May	117.9	10.8	14.4	4	4
01 Jun	131.9	26.3	14.4	1	1
02 Jun	132.4	34.8	14.4	3	4
03 Jun	134.0	27.2	14.4	1	1
04 Jun	139.5	33.1	14.4	1	1
05 Jun	145.0	37.2	15.0	5	7
06 Jun	148.7	41.7	15.0	1	1
07 Jun	143.1	39.2	----	3	4
08 Jun	132.1	24.9	15.0	3	4
09 Jun	123.6	16.5	14.4	5	6
10 Jun	116.3	9.4	14.4	4	4
11 Jun	103.6	0.0	13.9	2	2
12 Jun	110.6	5.3	13.9	4	4
13 Jun	118.2	14.5	13.9	3	3
14 Jun	114.0	16.2	12.8	2	2

Appendix Table 25. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature (°C)	water (°C)	Numbers detected	Adjusted numbers detected
15 Jun	119.0	18.7	12.8		0	0
16 Jun	122.7	18.9	12.8		2	2
17 Jun	117.1	13.7	12.8		0	0
18 Jun	116.8	13.0	15.6		2	2
19 Jun	117.9	13.8	15.6		1	1
20 Jun	118.2	15.6	14.4		0	0
21 Jun	112.3	11.5	15.6		0	0
22 Jun	100.1	10.2	15.6		1	1
23 Jun	85.9	9.5	15.6		0	0 --
24 Jun	89.9	9.9	15.6		4	4
25 Jun	89.6	9.5	15.6		0	0
26 Jun	89.6	11.7	15.6		0	0
27 Jun	90.5	14.7	15.6		1	1
28 Jun	99.0	8.0	15.6		1	1
29 Jun	103.2	0.0	15.6		1	1
30 Jun	96.4	0.0	16.7		0	0
01 Jul	90.3	0.0	16.7		1	1
02 Jul	82.2	0.0	17.2		2	2
03 Jul	74.4	0.0	17.8		1	1
04 Jul	92.3	0.0	17.8		1	1
05 Jul	93.7	0.0	19.4		0	0
06 Jul	76.3	0.0	18.3		0	0
07 Jul	70.9	0.0	18.3		0	0
08 Jul	77.2	0.0	18.3		0	0
09 Jul	69.5	0.0	18.3		1	1
10 Jul	78.0	0.0	18.3		1	1
11 Jul	74.8	0.0	18.3		0	0
12 Jul	76.1	0.0	18.3		0	0
13 Jul	74.3	0.0	18.3		0	0
14 Jul	68.9	0.0	18.3		0	0
15 Jul	58.3	0.0	19.4		0	0
16 Jul	57.7	0.0	19.4		0	0
17 Jul	52.7	0.0	19.4		0	0

Appendix Table 25. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature	water (°C)	Numbers detected	Adjusted numbers detected
18 Jul	57.9	0.0	20.0		0	0
19 Jul	53.7	0.0	21.1		0	0
20 Jul	52.1	0.0	21.1		0'	0
21 Jul	50.6	0 . 0	21.1		0	0
22 Jul	49.2	0.0	21.1		0	0
23 Jul	47.8	0.0	21.1		0	0
24 Jul	46.2	0.0	21.1		0	0
25 Jul	51.6	0.0	21.1		0	0
26 Jul	52.2	0.0	22.2		0	0
27 Jul	51.9	0.0	21.1		1	1
28 Jul	49.4	0.0	21.1		0	0
29 Jul	52.4	0.0	21.1		0	0
30 Jul	47.6	0.0	21.1		0	0
31 Jul	46.7	0.0	21.1		0	0
01 Aug	47.1	0.0 ,	22.5.		0	0
02 Aug	48.6	0.0	22.6		0	0
03 Aug	45.0	0.0	22.4		0	0
04 Aug	45.9	0.0	21.9		0	0
05 Aug	46.5	0.0	21.9		0	0
06 Aug	40.7	0.0	22.1		1	1
07 Aug	46.5	0.0	21.8		0	0
08 Aug	43.5	0.0	21.7		0	0
09 Aug	41.5	0.0	21.6		1	1
10 Aug	43.0	0.0	21.9		0	0
11 Aug	34.3	0.0	21.4		0	0
12 Aug	36.7	0.0	21.4		0	0
13 Aug	33.9	0.0	22.2		0	0
14 Aug	34.4	0.0	22.5		0	0
15 Aug	35.3	0.0	22.5		0	0
16 Aug	35.8	0.0	24.0		0	0
17 Aug	35.0	0.0	24.0		0	0
18 Aug	39.9	0.0	23.0		0	0
19 Aug	38.8	0.0	22.2		0	0

Appendix Table 25. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature (°C)	water (°C)	Numbers detected	Adjusted numbers detected
20 Aug	36.7	0.0	22.6		0	0
21 Aug	34.7	0.0	23.1		0	0
22 Aug	35.8	0.0	21.6		0	0
23 Aug	35.1	0.0	21.0		0	0
24 Aug	36.1	0.0	20.5		0	0
25 Aug	34.8	0.0	20.7		0	0
26 Aug	35.7	0.0	20.5		0	0
27 Aug	33.9	0.0	20.8		1	1
28 Aug	32.4	0.0	19.4		0	0
29 Aug	34.2	0.0	19.4		0	0
30 Aug	35.0	0.0	19.4		0	0
31 Aug	33.1	0.0	19.4		0	0

Appendix Table 26. Daily detections of PIT-tagged wild spring/summer chinook salmon smolts from Idaho at McNary Dam during 1995, with associated river flows (kcfs), spill (kcfs), and water temperatures (°C) at the dam. Numbers detected represent fish not detected at a previous dam. Adjusted numbers detected are calculated during spill.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature (°C)	Numbers detected	Adjusted numbers detected
22 Apr	169.0	41.5	----	0	0
23 Apr	129.7	29.2	----	0	0
24 Apr	184.4	56.7	----	0	0
25 Apr	189.8	50.9	----	0	0
26 Apr	213.8	74.3		0	0
27 Apr	220.0	70.3	----	0	0
28 Apr	226.1	64.6	----	2	3
29 Apr	203.7	49.7		0	0
30 Apr	210.9	63.1	----	3	4
01 May	218.4	70.4		3	4
02 May	265.1	105.6		2	3
03 May	237.2	87.6	----	2	3
04 May	220.9	83.6	----	1	2
05 May	258.8	114.2	----	1	2
06 May	232.6	100.9	----	0	0
07 May	205.8	78.4	----	2	3
08 May	251.4	100.0	----	1	2
09 May	244.4	102.1	----	1	2
10 May	238.3	93.8	----	0	0
11 May	259.0	111.9	----	2	4
12 May	243.7	97.2	----	2	3
13 May	224.0	91.2	----	2	3
14 May	207.0	76.9	----	1	2
15 May	251.7	113.5	----	3	5
16 May	260.7	120.3	----	4	7
17 May	286.1	133.1	----	2	4
18 May	288.2	129.7	----	3	5
19 May	279.1	122.3		1	2
20 May	255.9	116.2	----	1	2
21 May	232.0	101.0	----	2	4

Appendix Table 26. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case water temperature (°C)	Numbers detected	Adjusted numbers detected
22 May	259.8	114.9	12.8	1	2
23 May	272.3	127.1	12.8	5	9
24 May	265.1	119.0	12.8	0	0
25 May	277.1	133.3	12.8	0	0
26 May	269.6	121.8	13.9	1	2
27 May	247.3	101.9	12.8	0	0
28 May	213.5	78.6	13.9	1	2
29 May	228.6	92.5	14.4	0	0
30 May	282.8	129.7	14.4	2	4
31 May	309.7	119.9	14.4	0	0
01 Jun	292.4	118.1	14.4	2	3
02 Jun	286.4	109.3	14.4	0	0
03 Jun	264.9	110.2	15.0	3	5
04 Jun	210.0	107.3	15.0	1	2
05 Jun	276.3	117.0	15.0	0	0
06 Jun	285.5	123.7	15.0	3	5
07 Jun	260.0	135.1	15.0	0	0
08 Jun	274.5	127.1	14.4	0	0
09 Jun	270.0	118.8	14.4	0	0
10 Jun	280.6	125.1	14.4	0	0
11 Jun	277.9	140.7	14.4	0	0
12 Jun	290.1	134.8	15.0	1	2
13 Jun	289.6	131.6	15.0	0	0
14 Jun	295.6	137.3	15.0	0	0
15 Jun	298.1	134.6	15.0	1	2
16 Jun	274.6	109.3	15.0	0	0
17 Jun	253.1	92.2	15.0	1	2
18 Jun	247.6	95.5	15.0	0	0
19 Jun	254.6	105.0	15.0	0	0
20 Jun	286.0	124.7	13.9	0	0
21 Jun	279.6	109.9	15.0	0	0
22 Jun	285.6	116.3	15.0	0	0
23 Jun	277.0	122.2	15.0	0	0

Appendix Table 26. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case water temperature (°C)	Numbers detected	Adjusted numbers detected
24 Jun	280.4	118.5	15.0	0	0
25 Jun	273.5	121.1	15.0	0	0
26 Jun	263.3	110.7	15.0	0	0
27 Jun	292.7	128.5	16.7	1	2
28 Jun	270.7	117.8	16.7	0	0
29 Jun	291.4	123.7	16.7	0	0
30 Jun	277.1	114.7	16.7	0	0
01 Jul	237.6	81.5	16.7	0	0
02 Jul	210.9	39.7	16.7	0	0
03 Jul	213.0	40.8	16.7	0	0
04 Jul	218.6	44.2	16.7	0	0
05 Jul	224.8	47.8	16.7	0	0
06 Jul	230.8	57.2	17.8	0	0
07 Jul	231.7	56.8	17.8	0	0
08 Jul	215.1	15.7	17.8	0	0
09 Jul	200.6	0.0	18.9	0	0
10 Jul	190.5	0.0	18.9	0	0
11 Jul	193.7	0.0	18.9	0	0
12 Jul	203.5	5.8	18.9	0	0
13 Jul	206.2	6.5	19.4	0	0
14 Jul	198.9	0.0	19.4	1	1
15 Jul	177.8	0.0	18.3	1	1
16 Jul	164.1	0.0	18.9	0	0
17 Jul	195.1	0.0	18.9	0	0
18 Jul	186.2	0.0	18.9	0	0
19 Jul	186.1	0.0	20.6	0	0
20 Jul	171.7	0.0	20.6	1	1
21 Jul	174.2	0.0	20.6	0	0
22 Jul	156.5	0.0	20.6	0	0
23 Jul	161.3	0.0	20.6	0	0
24 Jul	172.8	0.0	20.6	0	0
25 Jul	169.4	0.0	20.6	0	0
26 Jul	180.7	0.0	21.7	0	0

Appendix Table 26. Continued.

Date	Average flow (kcfs)	Average spill (kcfs)	Scroll-case temperature (°C)	water (°C)	Numbers detected	Adjusted numbers detected
27 Jul	169.5	5.2	20.6		0	0
28 Jul	206.9	19.9	20.6		0	0
29 Jul	165.8	0.0	20.6		0	0
30 Jul	164.1	0.0	20.6		0	0
31 Jul	164.5	0.0	20.6		0	0

Appendix Table 27. Minimum, maximum, and average depth (in feet) by month at five monitoring sites in the Salmon River drainage from August 1994 through July 1995. These data were provided by Pacific Northwest Laboratories.

Marsh Creek (RKm 179.5 from mouth of the Middle Fork Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	0.76	0.64	1.05	1.23	1.58	1.53	1.07	0.74	1.04	2.35	3.34	2.84
Minimum	0.40	0.30	0.65	0.60	0.83	0.88	0.40	0.37	0.75	1.20	3.05	2.30
Maximum	1.10	0.90	1.33	2.17	2.34	2.46	1.51	1.11	1.38	3.47	3.79	3.40

Middle Fork Salmon River near Thomas Creek (RKm 97.6)

	August'	September	October	November	December	January	February	March	April	May ^a	June'	July"
Average	----	1.28	1.28	1.18	1.35	1.51	1.90	2.12	2.79	----	----	----
Minimum	----	1.00	0.86	-0.86	1.03	1.26	1.01	1.40	2.16	----	----	----
Maximum	----	1.60	1.90	1.46	1.72	1.70	2.71	2.87	3.33	----	----	----

Salmon River near Sawtooth Hatcher-v (RKm 627.9)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	1.00	0.98	1.26	2.66	2.81	2.85	2.89	2.86	3.07	3.63	4.49	4.55
Minimum	0.70	0.70	1.10	2.14	2.46	2.45	2.21	2.47	2.71	3.09	4.18	4.05
Maximum	1.30	1.30	1.45	3.18	3.12	3.33	3.35	3.30	3.33	4.34	5.05	4.97

Appendix Table 27. Continued.

Valley Creek (RKm 609.4 from the mouth of the Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	0.54	0.46	----	1.97	2.04	2.05	2.17	1.81	2.25	3.06	3.82	3.41
Minimum	0.20	0.10	----	1.57	1.70	1.70	1.54	1.37	1.91	2.35	3.45	2.80
Maximum	0.90	0.70	----	2.41	2.32	2.42	2.73	2.25	2.65	3.83	4.24	4.03

Salmon River below confluence with Yankee Fork (RKm 590.7)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	0.36	0.20	1.61	2.40	2.51	----	2.15	2.31.	3.06	4.93	6.98	5.59
Minimum	0.00	0.10	1.57	1.97	2.29	----	2.15	1.87	2.26	3.41	6.08	3.96
Maximum	0.80	0.50	1.67	2.79	2.75	----	2.15	2.79	3.5;	6.51	7.90	7.07

'Data loss occurred when high flows washed out the monitor.

Appendix Table 28. Minimum, maximum, and average water temperatures (°C) by month at five monitoring sites in the Salmon River drainage from August 1994 through July 1995. These data were provided by Pacific Northwest Laboratories.

Marsh Creek (RKm 179.5 from the mouth of the Middle Fork Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	11.91	8.88	4.81	0.73	0.59	0.63	1.77	1.98	3.42	4.71	7.48	10.65
Minimum	5.40	3.10	0.20	0.10	0.30	0.30	0.20	0.10	0.20	0.40	1.40	4.90
Maximum	20.10	15.30	11.60	4.10	3.40	3.40	6.90	8.60	10.10	12.90	14.70	18.10

Middle Fork Salmon River near Thomas Creek (RKm 97.6)

	August ^a	September	October	November	December	January	February	March	April	May ["]	June [']	July ["]
Average	----_	11.57	6.48	0.95	0.23	0.22	1.34	3.08	5.23	-----	---__	----_
Minimum	-----	8.90	1.30	0.20	0.20	0.20	0.20	0.20	2.00	-----	-----	-----
Maximum	-----	14.20	12.60	4.50	0.60	0.60	4.30	7.00	7.80	-----	-----	-----

Salmon River near Sawtooth Hatchery (RKm 627.9)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	13.95	11.40	8.70	1.29	1.48	1.45	2.81	3.56	6.16	7.85	9.70	13.24
Minimum	8.40	6.60	4.50	0.10	0.10	0.10	0.10	0.30	1.00	3.30	4.10	8.40
Maximum	20.80	17.20	17.10	5.30	4.60	4.90	7.60	9.80	11.50	13.10	15.90	19.00

Appendix Table 28. Continued.

Valley Creek (RKm 627.9 from the mouth of the Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	15.26	11.56	-----	0.74	0.76	0.74	1.41	2.61	4.59	7.66	9.74	13.21
Minimum	8.10	4.90	-----	0.30	0.30	0.20	0.20	0.30'	0.30	1.60	3.50	7.90
Maximum	23.40	18.90	-----	1.70	1.40	1.50	6.40	9.60	11.30	14.30	16.10	20.40

Salmon River below confluence with Yankee Fork (RKm 590.7)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	14.11	13.32	9.51	0.39	0.63	-----	1.40	2.74	5.12	6.53	7.95	12.77
Minimum	9.10	9.10	6.50	0.20	0.20	-----	0.40	0.20	0.80	2.60	3.70	7.50
Maximum	18.60	17.30	12.40	1.20	2.30	-----	2.20	7.20	9.60	11.10	12.90	18.00

"Data loss occurred when high flows washed out the monitor.

Appendix Table 29. Minimum, maximum, and average pH by month at five monitoring sites in the Salmon River drainage from August 1994 through July 1995. These data were provided by Pacific Northwest Laboratories.

Marsh Creek (RKm 179.5 from the mouth of the Middle Fork Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	8.00	8.13	8.24	7.92	7.86	8.06	8.54	7.75	7.59	8.22	9.37	8.19
Minimum	7.62	7.84	7.96	7.38	7.57	7.67	7.65	7.54	7.34	7.29	7.71	7.07
Maximum	8.57	8.79	9.03	9.22	8.35	8.89	9.85	8.39	8.34	10.09	10.26	9.73

Middle Fork Salmon River near Thomas Creek (RKm 97.6)

	August "	September	October	November	December	January	February	March	April	May ^a	June ¹	July ^a
Average	-----	7.56	7.93	7.99	7.98	8.06	8.34	8.57	8.67	-----	-----	-----
Minimum	-----	7.16	7.53	7.79	7.78	7.89	7.86	8.31	8.38	- ----	-----	-----
Maximum	-----	7.90	8.23	8.37	8.60	8.80	9.50	9.41	9.50	-----	-----	-----

Salmon River near Sawtooth Hatchery (RKm 627.9)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	7.70	7.83	7.88	8.21	8.29	8.42.	8.60	8.29	8.31	8.14	7.96	7.87
Minimum	7.30	7.53	7.62	7.79	7.98	8.14	8.22	7.97	7.97	7.77	7.64	7.38
Maximum	8.30	8.28	8.30	8.97	8.80	8.91	9.35	8.73	8.98	8.80	8.66	8.62

Appendix Table 29. Continued.

Valley Creek (RKm 627.9 from the mouth of the Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	8.27	8.48	-----	7.48	7.53	7.50	7.73	7.71	7.56	7.49	7.49	7.47
Minimum	7.74	7.96	----	7.28	7.19	6.99	7.16	7.31	7.16	7.13	7.02	6.76
Maximum	8.87	9.12	-----	7.85	8.60	8.87	8.85	8.72	8.61	8.12	8.38	8.55

Salmon River below confluence with Yankee Fork (RKm 590.7)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	8.77	8.85	8.88	8.09	8.14	-----	7.76	7.77	7.82	7.85	7.82	7.94
Minimum	8.24	8.38	8.53	8.00	8.02	-----	7.64	7.57	7.58	7.64	7.66	7.65
Maximum	9.42	9.42	9.40	8.23	8.60	-----	8.08	8.19	8.25	8.26	8.07	8.70

'Data loss occurred when high flows washed out the monitor.

Appendix Table 30. Minimum, maximum, and average specific conductance ($\mu\text{S}/\text{cm}^3$) by month at five monitoring sites in the Snake River drainage from August 1994 through July 1995. These data were provided by Pacific Northwest Laboratories.

Marsh Creek (RKm 179.5 from the mouth of the Middle Fork Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	66.10	68.50	71.95	60.17	62.31	65.77	63.09	50.60	47.97	36.79	32.85	38.97
Minimum	61.00	65.00	66.00	45.00	47.00	58.00	39.00	33.00	37.00	27.00	24.00	27.00
Maximum	71.00	74.00	76.00	75.00	72.00	72.00	69.00	60.00	57.00	45.00	39.00	69.00

Middle Fork Salmon River near Thomas Creek (RKm 97.6)

	August ^a	September	October	November	December	January	February	March	April	May ^a	June ["]	July ^a
Average	-----	97.13	95.12	90.50	88.84	94.27	89.70	92.01	84.76	-----	-----	-----
Minimum	-----	95.00	85.00	73.00	77.00	83.00	76.00	80.00	74.00	-----	-----	-----
Maximum	-----	98.00	98.00	103.00	106.00	111.00	99.00	104.00	97.00	-----	-----	-----

Salmon River near Sawtooth Hatchery (RKm 627.9)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	163.17	175.87	182.96	137.73	135.36	140.91	138.76	145.25	135.34	100.73	78.62	70.63
Minimum	152.00	168.00	179.00	124.00	110.00	121.00	129.00	132.00	121.00	76.00	64.00	58.00
Maximum	173.00	186.00	188.00	149.00	154.00	158.00	157.00	161.00	157.00	125.00	97.00	88.00

Appendix Table 3 0. Continued.

Valley Creek (RKm 627.9 from the mouth of the Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	84.01	91.66	-----	69.23	71.26	74.82	74.03	64.30	53.18	42.64	29.15	32.72
Minimum	76.00	85.00	-----	64.00	64.00	67.00	64.00	55.00	43.00	35.00	21.00	21.00
Maximum	93.00	104.00	-----	79.00	80.00	82.00	86.00	'79.00	68.00	51.00	40.00	45.00

Salmon River below confluence with Yankee Fork RKm 590.7)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	146.20	163.11	166.53	106.69	103.60	-----	94.73	87.56	80.61	63.71	47.79	54.70
Minimum	116.00	153.00	160.00	97.00	94.00	-----	91.00	61.00	73.00	48.00	41.00	45.00
Maximum	165.00	173.00	176.00	128.00	119.00	-----	101.00	101.00	93.00	96.00	58.00	70.00

^a Data loss occurred when high flows washed out the monitor.

Appendix Table 3 1. Minimum, maximum, and average dissolved oxygen (percent -saturation) by month at five monitoring sites in the Salmon River drainage from August 1994 through July 1995. These data were provided by Pacific Northwest Laboratories.

Marsh Creek (RKm 179.5 from the mouth of the Middle Fork Salmon River)

	August	September	October	November	December	January	February	March	April	May ^a	June ^c	July ^a
Average	85.75	88.95	90.60	90.23	100.36	90.08	52.86	72.26	81.62	-----	-----	-----
Minimum	77.38	81.41	84.84	81.70	92.05	74.42	32.82	63.50	75.20	-----	-----	-----
Maximum	95.78	99.69	99.93	106.00	106.45	103.64	78.28	81.90	92.30	-----	-----	-----

Middle Fork Salmon River near Thomas Creek (RKm 97.6)

	August ^b	September	October	November	December	January	February	March	April	May ^b	June ^b	July ^c
Average	-----	83.30	64.35	73.83	96.62	100.10	102.49	101.78	98.98	-----	-----	-----
Minimum	-----	76.00	52.80	50.50	92.40	96.90	99.90	95.30	95.00	-----	-----	-----
Maximum	-----	93.70	86.70	95.80	103.60	104.50	107.20	106.70	105.50	-----	-----	-----

Salmon River near Sawtooth Hatchery (RKm 627.9)

	August [*]	September ^c	October	November	December	January	February	March	April	May	June	July
Average	-----	-----	105.11	79.02	86.94	91.76	95.08	93.81	98.58	103.42	105.88	93.52
Minimum	-----	-----	93.50	73.36	79.33	86.53	88.00	86.10	89.20	86.30	84.00	74.70
Maximum	-----	-----	142.30	88.11	97.93	102.15	113.03	109.10	121.20	121.00	122.80	120.70

Appendix Table 3 1. Continued.

Valley Creek (RKm 627.9 from the mouth of the Salmon River)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	92.80	83.19	-----	87.41	91.54	91.09	94.19	86.36	87.50	88.25	90.37	86.31
Minimum	73.40	52.50	-----	83.46	87.23	82.93	70.29	81.40	82.40	83.10	79.80	73.70
Maximum	112.60	98.00	-----	92.84	98.64	98.72	105.31	95.20	97.00	98.60	103.50	102.40

Salmon River below confluence with Yankee Fork (RKm 590.7)

	August	September	October	November	December	January	February	March	April	May	June	July
Average	72.70	59.68	57.10	91.66	93.89	-----	100.19	101.91	112.51	118.45	121.67	118.62
Minimum	59.50	30.90	51.70	87.76	90.83	-----	94.90	93.60	103.60	113.20	117.50	111.00
Maximum	88.70	65.60	62.70	96.09	97.67	-----	114.00	123.40	122.10	123.60	125.40	136.60

^a Data not presented due to equipment problems.

^b Data loss occurred when high flows washed out the monitor.